

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 77

Number 24

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Philadelphia—Chestnut & 56th Sts., Phone Sherwood 1424
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Cable AddressAutoLand, Philadelphia

SUBSCRIPTION RATES: United States, United States Possessions, and all countries in the Postal Union, \$1.00 per year; Canada and Foreign, \$2.00 per year. Single Copies this issue, 25c.

Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Entered as second-class matter Oct. 1, 1925, at the post office at Philadelphia, Pa., under the Act of March 3, 1879.
Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903, the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

Owned and Published by



CHILTON COMPANY
(Incorporated)

Executive Offices

Chestnut and 56th Streets, Philadelphia, Pa., U. S. A.

Officers and Directors

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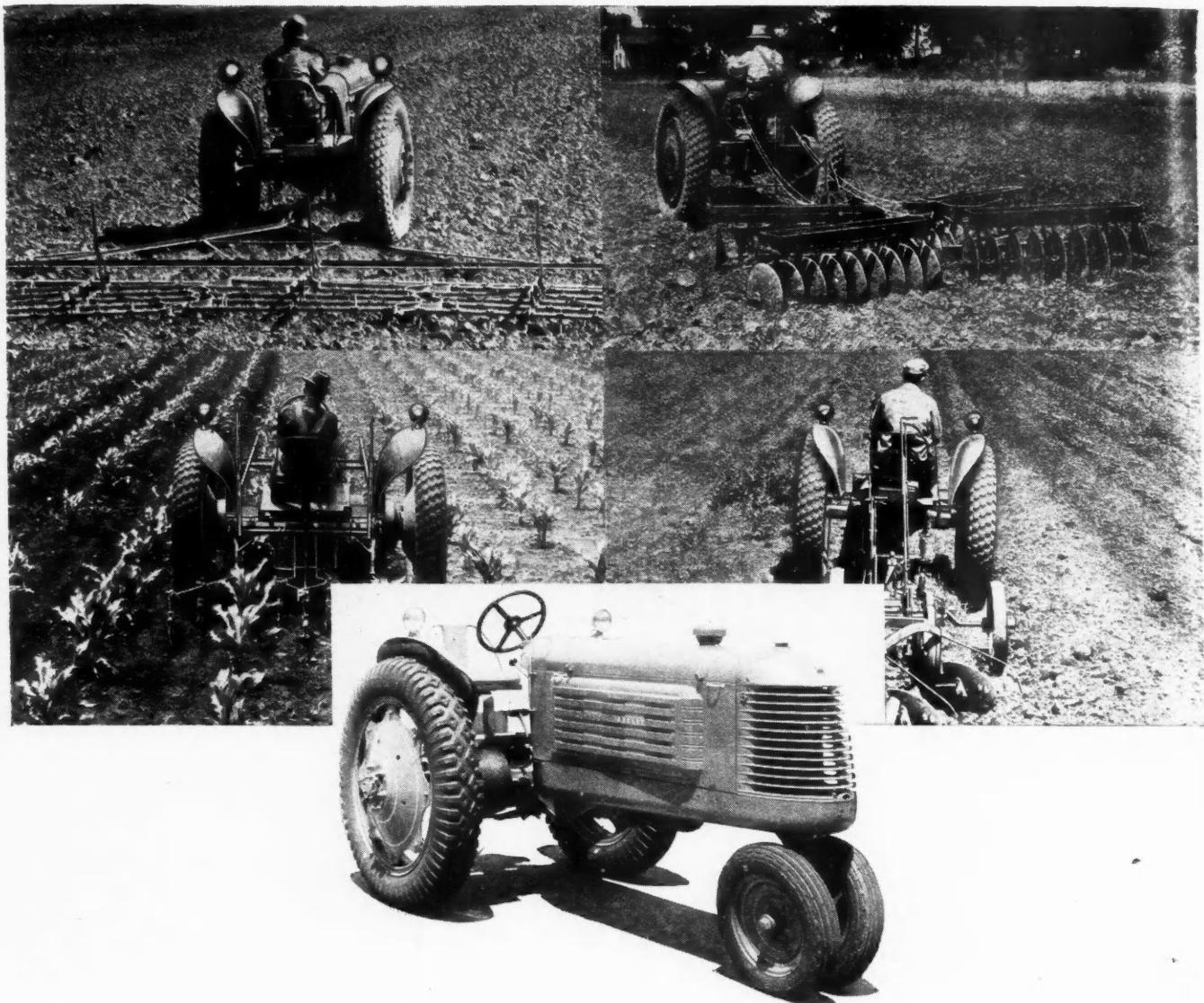
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December 11, 1937

When writing to advertisers please mention Automotive Industries

Automotive Industries

Published Weekly

Founded 1895

AUTOMOTIVE INDUSTRIES

December 11, 1937

Vol. 77, No. 24



C. S. FLETCHER

... recently appointed sales manager of The Studebaker Corp., to succeed Louis K. Manley. Mr. Fletcher joined the corporation 15 years ago to take, as his first job, work on the assembly line testing and assembling new cars.

Three years ago Mr. Fletcher joined the general administrative staff in South Bend as sales promotion manager of the corporation. Last April he was made assistant sales manager.

Ford Speed-Up Swells Output Total

Industry Must Turn Out 332,000 Units In December to Attain 5,000,000 Mark for 1937

While expanding Ford production is going a long way toward offsetting curtailments elsewhere in the automobile industry, the net result for December unquestionably will be a drop from the November output total. Present prospects are for only a moderate reduction but the picture changes almost daily. A number of companies expect to hold to the four-day rate throughout the month but some are due to cut down to three days a week. On the other hand, a few plants have found their retrenchment a little too drastic and are stepping up operations. One of the leading companies, on a three-day week, is considering going back to four in response to a pick up in sales.

In general, operations are on a day-to-day basis. Only the companies which were delayed in their start on 1938 models have definite schedules set up for the month. These are Ford, Packard and Graham. Ford has made good progress this month in building up production, daily rate now approximating 5000 units, at which level it is expected to hold for

the balance of the month and probably into the winter. It will depend largely on the labor situation. If the company can escape union interference, its heavy operating schedule will take up much of the slack in Detroit employment this winter.

Final estimate of the industry's November production, based on reports now at hand from all the leading companies, shows a total of 375,000 cars and trucks, an increase of approximately 10 per cent over the October output and a drop of 7.5 per cent from the total for November last year. Thus in the first 11

(Turn to page 826, please)

GM Reports Sales

November Figure of 195,136 Ahead Of October Total by 17%

November sales of General Motors cars to dealers in the United States and Canada, together with shipments overseas, totaled 195,136 compared with 191,720 in November a year ago. Sales in October were 166,939. Sales for the first 11 months of 1937 totaled 1,956,453 compared with 1,798,576 for the same 11 months of 1936.

Sales of General Motors cars to consumers in the United States totaled 117,387 in November compared with 155,552 in November a year ago. Sales in October were 107,216. Sales for the first 11 months of 1937 totaled 1,504,533 compared with 1,546,741 for the same 11 months of 1936.

Sales of General Motors cars to dealers in the United States totaled 153,184 in November compared with 156,041 in November a year ago. Sales in October were 136,370. Sales for the first 11 months of 1937 totaled 1,571,792 compared with 1,485,529 for the same 11 months of 1936.

Success Marks After-Market Siege

Week-Long Assault on Jobbers' Division of Replacement Field Ends as Automotive Service Industries Show Closes

Parading its magnitude in an impressive layout of nearly 400 exhibits, the automotive after-market took over Chicago's Navy Pier for a six-day selling orgy which climaxed on Dec. 11.

A canvass of exhibitors disclosed uniform satisfaction with the tone and results of the week-long assault on the jobbers' division of the replacement market.

Managed by A. B. Coffman, and with Herbert Buckman of Cleveland

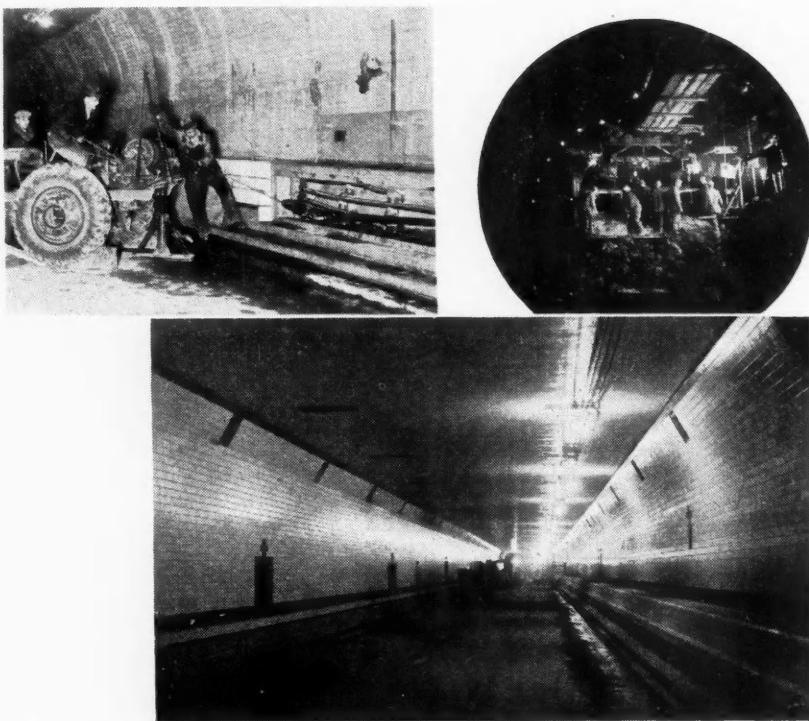
as secretary of the joint operation committee of the participating associations, the Automotive Service Industries Show demonstrated once again its peculiar double function as a show place for parts, accessories and equipment sold through automotive wholesalers, and as a proving ground where industrial suppliers can learn about the marketing problems of their industrial customers.

Although jobbers attending the

(Turn to page 826, please)

LINCOLN LINK Form a 1 dedicating the Lincoln Tunnel connecting New York's Manhattan with the mainland are scheduled for Dec. 21, 1937. One tube will be opened to two-way toll-paying automobile

traffic at 4 a.m. on Dec. 22. The pictures show tunneling operations in the south tube (circle), workmen pulling electrical cable into ducts below the sidewalk by means of a winch on a gasoline tractor (top), and (bottom) a section with wall tiling in place.



Lincoln Link

The new underwater link is similar in design to the Holland Tunnel and is under the supervision of The New York Port Authority. Some pertinent facts revealing the extensive automotive responsibilities of the Port Authority were presented by Billings Wilson, assistant general manager, in a paper recently delivered in Newark, N. J., before the Metropolitan Section Regional Transportation and Maintenance Meeting of the Society of Automotive Engineers.

The Port Authority was established in 1922 by treaty between New York and New Jersey, as Mr. Wilson states, "primarily to foster more economical methods of freight distribution." Today the Port Authority is best known as constructor and operator of interstate vehicle crossings. Its administrative responsibilities include, in addition to the new tunnel, the Holland Tunnel and four bridges, the George Washington, the Outerbridge Crossing, the Goethals, and the Bayonne. While the Holland Tunnel was not built by the Port Authority, it is now owned and operated by the Port Authority as a result of legislation enacted by the two states in 1930.

With the opening of the Lincoln Tunnel nearly 70 per cent of the Port Authority vehicular traffic (approximately 17,000,000 vehicles) will be handled by the two tunnels. Trucks will form one-seventh of this volume.

Before starting the design of the Lincoln Tunnel in 1930, quoting Mr. Wilson, "the Port Authority investigated the trends of vertical and lateral clearances of motor vehicles and determined upon a tunnel roadway width of 21 ft. 6 in. This is 1 ft. 6 in. more than in the Holland Tunnel. Lateral clearance was determined on the basis of an 8 ft. width for passenger cars and buses and a 9 ft. width for trucks, with a 1 ft. clearance on each curb and a 2 ft. 6 in. clearance between the parallel lanes. Final decision on these dimensions was arrived at only after especially exacting preliminary investigation due to the fact that each additional 6 in. of tunnel roadway costs approximately \$1,000,000.

Vertical clearance is 13 ft. plus allowance for jacking up of disabled vehicles. This is 6 in. higher than the Holland Tunnel. Curves in the tunnels necessitate restricting the length of vehicles, however, the Port Authority tunnels will accommodate vehicles longer than the maximum lengths allowed by the highway laws of New York and New Jersey.

Both tunnels are designed for a load of 20 tons per axle not less than 5 ft. apart, or 16 tons on each dual rear axle not less than 4 ft. apart.

What will probably be the most powerful wrecking truck in the world is now under construction by the Mack Truck Co. at a cost of \$44,000. It will be used to retrieve vehicles disabled in the tunnel.

Union Seeks GM Vote Via NLRB

UAW Petitions to Force Action on Sole Bargaining Issue; W. S. Knudsen Saves Stalemated Arbitration Conference

The UAW has petitioned the National Labor Relations Board for elections in eight General Motors plants to determine the sole bargaining issue. A union spokesman said that ultimately elections would be asked in all GM plants but the recent petition covered only certain plants in the Michigan district which he declined to name. The step was taken in pursuance of the recommendation of the committee of 17 appointed by delegates from the various GM locals at their meeting in Detroit a few weeks ago when they rejected the proposed revisions in the corporations contract.

Since GM has not consented to the elections, hearings will have to be held by the labor board before they

are authorized. The union is hopeful of holding at least one or two elections before the end of the year.

The UAW committee investigating the Pontiac Fisher Body strike has completed its inquiry and is expected to report its recommendations to international officers by the end of the week. Homer Martin has promised drastic disciplinary action against those found responsible for the unauthorized strike.

Intervention of W. S. Knudsen, president of General Motors Corp., saved from collapse the arbitration conference which was to settle a dispute between the corporation and the United Automobile Workers. Called for Dec. 1, the conference was stalemated several days by the wrangling

of attorneys over procedural differences. Arbitrator Willard E. Hotchkiss finally left for Washington, D. C., to await a call to return. Agreement on procedure was reached late last Saturday between Knudsen and Homer Martin.

Questions to be settled by the arbitrator will include whether six Fisher employees were discharged unjustly and whether they should receive back pay and retain their seniority ratings. One of the differences was over the question of back pay. The union also had demanded that the extent of the penalty be determined and insisted that decisions be made on various points of discipline with view to setting up precedents for the future. But the corporation held that the proceedings should be limited to determination of the one issue; were the men discharged justly or not. If they were, they were to remain dismissed; otherwise reinstated with back pay. Regular rules of evidence will be followed.

One of the first acts of Charles Madden, after his appointment as administrator in full charge of the Pontiac local of the UAW, was to discontinue the local's publication, the "Pontiac Auto Worker," which had carried on in defiance of the international executive board's order demanding discontinuance of all local publications. Dismissal of the Pontiac paper's staff and Odin H. Johnson, attorney for the local who had played a prominent part in last sum-

mer's rent strike, was explained by Madden as an economy step. The paper hereafter will be published as part of the international's publication.

"While the finances of the local are not in bad condition," said Madden, "its income is diminishing just like others, due to the layoffs in the industry and the recent strike in Pontiac." Negotiations with the Fisher Body management have been put off until investigation of the strike, ordered by the international, is completed.

Claiming membership of a majority of the workers at the Ford St. Louis branch, the UAW petitioned the National Labor Relations Board for certification as the collective bargaining agency for employees at the plant. Hearings were set for Dec. 16, the same time that the company is called upon to answer charges, preferred by the union, of unfair labor practices. The union contends that it has a membership of 814 workers in the plant out of a total of 1100.

Ford attorneys have filed an injunction suit against 121 union members in an effort to enjoin them from picketing the assembly plant. They are charged with attempting to damage the company's business by interfering with operation of the plant through intimidation of employees. The court is asked to determine damages. Judge Robert J. Kirkwood set Jan. 24 as date for hearings, delay being granted at request of both sides. The defense asked for more time to prepare the case, and the company's attorneys had asked for a one-week continuance because only 19 of the 121 defendants had been served. The judge promised to issue a restraining order at any time if there were any indications of violence at the plant.

Delegates from six Chrysler locals in Detroit met Dec. 5 to lay plans for negotiating a new contract with the corporation, the present contract expiring March 31. A committee of four from each of the locals was appointed to study alleged violations of the existing contract by the corporation. Their report will form the basis on which the UAW will seek to negotiate a new agreement. Leo Lamotte and R. J. Thomas, executive board members, were appointed to ask the Chrysler management to reduce the present weekly work schedule of 32 hours to no less than 24 so that work may be spread among as many employees as possible.

Governor Murphy was proposed as mediator in the fight between the AFL and the CIO in a resolution passed by the Wayne County Feder-



F. G. WACKER

... was confirmed as president of the Motor and Equipment Manufacturers Association at a dinner of the association held in Chicago, Dec. 7 during the Automotive Service Industries Show. Mr. Wacker is president of the Automotive Maintenance Machinery Co., North Chicago, Ill.

ation of Labor. Copies of the resolution were sent to William Green and John L. Lewis. It stated that "if those now endeavoring to bring about a settlement of the present controversy find themselves unable to effect completely a satisfactory understanding, that all matters remaining in dispute be submitted to some impartial recognized friend of the labor movement to act as arbitrator so that the controversy can be speedily and properly settled."

The aid of Governor Murphy was also sought by the general welfare council of the Detroit District of the UAW, representing 35 locals, in furthering a six-point program comprising the following aims: To stop layoffs in industry by spreading

(Turn to page 831, please)

MEN OF THE INDUSTRY

HAROLD E. LONG, formerly vice-president in charge of purchases, Nash Motors Co., Kenosha, Wis., has been named vice-president of Nash-Kelvinator Corp. and placed in charge of all purchasing for all units of the parent company. Mr. Long's department recently was transferred from Kenosha to Detroit.

PHIL HUBER was recently elected president and general manager of the Ex-Cell-O Corp., Detroit. Formerly vice-president and assistant general manager of that company.

(Turn to next page, please)



L. G. MATTHEWS

... the assistant treasurer of the Sealed Power Corp., Muskegon, Mich., who was elected senior vice-president of the National Standard Parts Association at the association's convention preceding the Automotive Service Industries Show held in Chicago, Dec. 6 to 9.

Mr. Huber succeeds N. A. Woodworth who has resigned because of ill health.

HOWARD B. KASTER has been appointed director of meteorology for United Air Lines. Mr. Kaster has been connected with United's weather development service for the past seven years.

BRABSON HALEY recently joined the sales force of Lawrence M. Hirsig, Inc., Jacksonville, Fla. As field engineer for the Fleming Mfg. Co., Mr. Hale, for the past year, had been assigned to the Hirsig organization in the promotion of Fram Oil Cleaner sales.

J. W. DUNBAR has been appointed assistant to C. H. Lang, advertising manager of the General Electric Co. Mr. Dunbar's headquarters will be in New York City.

H. J. GEORGEN has been added to the sales staff of Michigan Products Corp., Michigan City, Ind. Mr. Georgen's headquarters will be in Chicago.

F. J. ELLIOTT has been appointed Cleveland district sales manager for the Rustless Iron & Steel Corp., Baltimore, Md. Mr. Elliott, who will handle sales and service in the State of Ohio, was formerly with E. F. Houghton & Co.

W. A. BRUSH, motor car pioneer, has been elected president of the Automobile Club of Michigan, largest club in the American Automobile Association. Mr. Brush succeeds Charles L. Weeks, Detroit engineer.

GEORGE T. CHAPMAN joined the Eaton Mfg. Co., spring division, Detroit, in October. Mr. Chapman is in charge of machine development engineering.

Ford Swells Total

(Continued from page 823)

months this year, the industry turned out 4,668,000 units or 14 per cent more than in the corresponding period of 1936. December must account for 332,000 units if the 1937 output is to reach the 5,000,000 mark. Taking into consideration the latest reduction in operations, it appears that the goal will be reached with only a small margin, since the December forecast now stands at 345,000 units.

The last half of November brought a sharp contraction in the retail sales volume. Where normally the last reporting period of the month is the heaviest, the last 10 days of November showed a big shrinkage from preceding periods. Deliveries of six leading companies were off about 14 per cent from the first 10 days. For the same companies, the November sales total was down 24 per cent from the November, 1936, volume.—H. E. G.

Joseph Whittaker

Joseph Whittaker, former vice-president and general manager of the Hudson Motor Car Co., died of a heart attack at his home in Detroit on Dec. 7. Mr. Whittaker, who was 57 at death, had retired seven years ago after serving Hudson for 20 years.

NADA Voices Protest

Suggested Slash of Highway Fund Criticized by E. M. Lied

Strong opposition to President Roosevelt's recommendation for curtailment of Federal road expenditures was voiced by the executive committee of the National Automobile Dealers Association at a meeting in Detroit, Dec. 8.

"President Roosevelt's recommendation to Congress, while undoubtedly motivated by a very genuine desire to reduce Federal expenditures and bring about a very necessary balancing of the national budget, would in the opinion of motor vehicle dealers, tend to a further deceleration of business and decrease employment, thereby producing a result entirely opposite to that sought and desired," stated E. M. Lied, president of the NADA.

"It should be pointed out," Mr. Lied said: "that the funds used for highway construction are paid for directly by automobile owners in the form of taxes collected by the Federal and state governments, and that actually, therefore, the Federal Government does not contribute for highway building from general taxation. If Federal highway appropriations are to be reduced, reduction should be made in the amount of tax now being assessed and collected from automobile users, who already support a very heavy tax burden."

Fred Smith to Getchell Agency

Fred Smith, formerly publicity director of Batten, Barton, Durstine and Osborn, has been appointed publicity director of J. Stirling Getchell, Inc. He succeeds Harry Bercovich, Jr., who was recently elected vice-president of the Getchell agency.

A.S.I. Show

(Continued from page 823)

A. S. I. Show and the conventions which preceded it were less inclined than they were last year to promote the necessity of longer discounts from manufacturers, they were in an aggressive mood and launched through the Motor and Equipment Wholesalers Association a number of resolutions affecting their relations with manufacturers. One of the resolutions expressed dissatisfaction with December as a show month. Recommending that the show should be held during February, preferably some

time after the tenth of the month. If this recommendation were adopted by the joint operation committee of the show it would mean, of course, that no A. S. I. Show would be held in 1938.

The question of price maintenance, particularly on repair shop equipment, dominated jobber conversations. One MEWA resolution called for active support of state fair-trade acts and the Tydings-Miller Act.

Manufacturers were asked, in another, to permit their warehouses to supply only jobbers who regularly stocked their lines. Manufacturers were also urged to supply jobbers with resale price schedules far enough in advance of price changes to enable the jobber to be prepared properly.

The MEWA staff was instructed to study the present nature of contracts between jobbers and manufacturers and advise the membership of any significant trends or changes in contractual relations. The association went on record as being opposed to manufacturers offering prizes or other inducements to jobber salesmen to push one of their lines.

Independent replacement parts manufacturers presented the National Standard Parts Association with a strong plea for more support in advancing their cause. Fortified by an NSPA resolution promising study of ways and means of lending the association's help, about thirty of the independents held an informal meeting in an effort to establish a united front on their problems as distinguished from those of manufacturers who have some original equipment business or motor-vehicle-factory sponsorship for their products.

—H. H.

... slants

POLAR PUMP—The first Ethyl pump in the Polar regions has been installed at Fairbanks, Alaska, 115 miles from the Arctic Circle. C. J. McFarlane, who reported the installation, says, "The North country will see a great deal of activity in the near future. The northwest route from Canada to the Orient is 4000 miles shorter than the present one from Oakland, Calif., and over land a large part of the way." Mr. McFarlane is the Calgary representative of the Ethyl Gasoline Corp.

EYES FRONT—That Indiana school children riding buses should face the

front is the belief of the state school bus safety committee, which promulgated a rule in late November requiring that all school buses built after March 1, 1938, must be equipped with seats parallel with the driver's seat. The regulation will not scrap any buses now in use or built before the specified date.

PEACOCK PLATES — Thirty-five states have adopted entirely new color schemes for 1938 license tags, according to the American Automobile Association. Reports the AAA, "The black and yellow combination has regained the popularity it unaccountably lost last year and now leads the list with acceptance by 10 states. Black and white, last year's most widely used combination, has dropped out of favor and will be used by only five states."

Aluminum has scored an "overnight" hit and will decorate the 1938 tags of eight states and three Canadian provinces. Hues for Florida's new plates will be "canary yellow" and "midnight blue," while cars in Ontario, Canada, are to sport "orange" and "peacock blue."

AMA November Sales 363,538

November factory sales of American automobile manufacturers totaled 363,538 cars and trucks, according to a preliminary estimate made by the Automobile Manufacturers Association.

On the basis of the estimated figure, November operations represented an 8 per cent increase over the preceding month and a 10 per cent decrease compared with November, 1936.

Factory sales for the 11 months' period of this year were placed at 4,656,530, 14 per cent above the 4,097,316 units sold during the corresponding period of last year.

Tire Tax 14% Over '36

Increased Excise Payments Due To Heavy First Quarter Output

The rubber and tire industry paid 14.2 per cent more excise tax on tires and 7.5 per cent more tax on tubes in the first 10 months of 1937 than for the same period of 1936, according to Treasury Department records. The increases were due largely to the heavy production of tires and tubes in the first quarter year when sales soared to a new first quarter record on the strength of speculative buying and two price increases. For the first quarter alone the tax

Dollar Volume of '37 Imports 146% Over '36

Analysis of automotive export and import statistics for the 10 months ended October, 1937, and 1936, reveals a significant leap upward in the amount of outgoing and incoming goods.

Largest per cent increase is found in the dollar volume of imported automobiles (dutiable) which soared to 146 per cent for 10 months in 1937 compared to the similar period for 1936. On the same basis, exports of automobiles, parts and accessories rose 45.8 per cent.

The export upswing split into components shows passenger cars and chassis up 34.2 per cent, commercial vehicles topping '36 by 75.5 per cent, and parts rising 34.6 per cent. Engine exports also increased.

	OCTOBER		OCTOBER		TEN MONTHS ENDED OCTOBER			
	1937		1936		1937		1936	
	No.	Value	No.	Value	No.	Value	No.	Value
EXPORTS								
Automobiles, parts and accessories	25,408,377		15,765,849		277,335,510		190,217,962	
PASSENGER CARS		\$		\$		\$		\$
Passenger cars and chassis	17,199	10,378,716	9,747	6,111,642	177,531	103,235,009	135,392	76,895,666
Low price range \$850 inclusive	15,551	8,681,152	8,507	4,816,480	162,431	86,568,239	124,445	64,468,525
Medium price range over \$850 to \$1,200	1,492	1,394,598	900	849,537	12,519	11,843,598	8,837	8,486,629
\$1,200 to \$2,000	83	121,666	152	228,403	1,655	2,841,057	1,397	2,082,452
Over \$2,000	73	181,300	88	218,222	726	1,982,115	713	1,858,080
COMMERCIAL VEHICLES								
Motor trucks, buses and chassis (total)	8,300	6,680,776	6,770	3,817,581	131,683	79,671,403	88,012	45,385,870
Under one ton	692	338,899	701	308,563	17,133	6,847,573	13,425	5,141,535
One and up to 1½ tons	3,724	2,243,126	4,791	2,291,183	85,155	41,976,599	58,617	27,147,297
Over 1½ tons to 2½ tons	2,703	2,419,364	1,084	872,934	21,279	16,783,277	11,717	8,659,232
Over 2½ tons	1,060	1,548,269	166	321,518	6,857	13,030,237	2,375	3,527,291
Bus chassis	121	131,098	28	23,383	1,259	1,033,767	1,878	909,885
PARTS, ETC.								
Parts except engines and tires								
Automobile unit assemblies	3,161,150		2,507,283		45,523,656		33,789,397	
Automobile parts for replacement (n.e.s.)	3,715,015		2,363,905		31,893,439		22,190,042	
Other automobile accessories (n.e.s.)	581,223		341,436		3,970,940		2,757,384	
Automobile service appliances	518,476		440,529		5,454,311		3,788,335	
Airplanes, seaplanes and other aircraft	61	1,845,597	31	719,674	516	17,302,930	403	8,786,326
Parts of airplanes, except engines and tires	1,225,268		897,194		8,775,995		5,089,513	
INTERNAL COMBUSTION ENGINES								
Stationary and Portable								
Diesel and semi-Diesel	100	273,568	31	68,956	746	1,902,956	322	912,157
Other stationary and portable								
Not over 10 hp.	1,155	71,152	2,079	65,928	15,538	910,575	10,985	633,198
Over 10 hp.	279	140,761	206	129,659	2,907	1,398,499	1,949	859,704
Engines for:								
Motor trucks and buses	693	58,046	497	65,491	27,776	2,743,462	18,448	1,821,472
Passenger cars	5,594	333,487	1,760	99,564	69,777	4,726,797	41,024	2,822,330
Aircraft	85	531,367	111	769,487	671	4,763,415	727	4,128,444
Accessories and parts (carburetors)	262,256		185,126			2,317,238		1,625,869
IMPORTS								
Automobiles (dutiable)	246	146,483	228	119,772	1,736	1,048,606	875	426,206

increase on tires was 36.8 per cent and on tubes was 34.2 per cent.

The total excise tax in the first 10 months was \$28,676,100 on tires and \$5,639,400 on tubes, compared with \$25,081,300 and \$5,241,100, respectively, for the same period of 1936.

The records by quarter year periods, with October figures added, are:

Quarters	Rubber Tires		
	1936	1937	1937
1	\$6,154.3	\$8,418.0	+ 36.8%
2	\$8,238.4	8,176.8	- 0.7%
3	9,951.0	9,128.1	- 8.3%
Oct.	1,737.6	2,953.2
10 mos.	\$25,081.3	\$28,676.1	+ 14.2%
Quarters	Inner Tubes		
	1936	1937	1937
1	\$1,237.0	\$1,661.3	+ 34.2%
2	1,638.5	1,589.6	- 3.0%
3	2,022.3	1,803.5	- 10.9%
Oct.	343.3	585.0
10 mos.	\$5,241.1	\$5,639.4	+ 7.5%

Chevrolet Promotes Managers

The promotion of three members of Chevrolet's wholesale organization was announced this week by W. E. Holler, Chevrolet general sales manager. The men affected are Ivan X. Sarvis, zone manager at Omaha; Clarkson C. Schelp, city manager at St. Louis; and Charles E. Humphrey, assistant zone manager in charge of used cars at Houston.

Mr. Sarvis, who joined the Chevrolet organization in June, 1926, has been promoted to the position of zone manager at Houston. Mr. Schelp, who goes to Omaha as zone manager, joined the Chevrolet field organization as sales representative at St. Louis in July, 1929. Mr. Humphrey succeeds Mr. Schelp as St. Louis city manager.

Business in Brief

Written by the Guaranty Trust Co., New York

General business activity continued to decline last week. The weekly index compiled by the *Journal of Commerce* stood at 79.2, as against 85.2 the week before and 98.0 a year ago. The current figure represents the ninth consecutive weekly decline in this index. The increased demand for winter goods and more active holiday purchasing had the effect of raising the level of retail trade from 1 to 4 per cent above that in the preceding week, and from 3 to 12 per cent above that in the corresponding period last year. Wholesale trade showed an increase from 3 to 10 per cent above that a year ago.

Preliminary calculations indicate, according to some observers, that the level of industrial output, as measured by the index of the Board of Governors of the Federal Reserve System, for the current month will fall to the lowest point since 1934. The rate of recession in activity since Labor Day is expected to exceed that in 1929 or in any other similar period on record.

Net operating income of class 1 railroads during October declined sharply to \$60,747,445, as compared with \$89,809,372 in the corresponding period last year.

Railway Freight Falls

Railway freight loadings during the week ended Nov. 27 amounted

to 558,627 cars, which marks a decline of 88,624 cars below those in the preceding week, a fall of 121,672 cars below those a year ago, and a drop of 13,251 cars below those two years ago.

Production of electricity by the electric light and power industry in the United States during the week ended Nov. 27 was 6 per cent below that in the corresponding period last year.

Production of lumber during the week ended Nov. 20 was at 53 per cent of the 1929 weekly average. Output was 29 per cent larger than new business and 22 per cent greater than shipments. All three items were slightly below the levels in the preceding week.

Fisher's Index Shows Decline

Professor Fisher's index of wholesale commodity prices for the week ended Dec. 4 stood at 84.6, as compared with 85.1 the week before and 86.1 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended Dec. 1 showed an increase of \$1,000,000 in holdings of discounted bills. Bills bought in the open market and Government securities remained unchanged. Money in circulation increased \$14,000,000, and the monetary gold stock remained unchanged.

Buick Aims at 20,191

December schedules of the Buick Division of General Motors call for production of 20,191 cars, which will bring total output of 1938 models through Dec. 31 to 85,516. This represents an increase of 12 per cent compared with the 76,359 cars built in the corresponding period last year.

Eighteen days will be worked full shift during the current month, according to Harlow H. Curtice, president of Buick Division of General Motors. In the 20 days worked in November 24,461 cars were produced, and for the 21 days worked in October the output totaled 25,001.

Mr. Curtice anticipates only a slight change in Buick employment during December, with approximately 15,000 hourly rate workers as compared with 15,500 the previous

month. Total employment will be more than 17,000.

"Domestic retail deliveries during September, October and the first 20 days of November," reported Mr. Curtice, "totaled 42,098 as against production for domestic shipment of 52,622 cars. Sales during the same period a year ago totaled 26,282."

Olds 11 Months' Sales Up 11%

Oldsmobile sales for the first 11 months this year totaled 178,398 units, a gain of more than 11 per cent, as compared with 159,764 for the same period in 1936.

Retail sales for the month of November totaled 11,239, according to D. E. Ralston, general sales manager for Oldsmobile. November sales of new Oldsmobiles represent a gain of 45 per cent over November last year, Mr. Ralston reported.

Financial Notes

Waukesha Declares Dividend On \$5 Par Common Stock

The Board of Directors of the Waukesha Motor Co. has authorized payment of the regular quarterly dividend of 25 cents per share, payable Jan. 3, 1938, on the \$5 par common stock. The dividend will be paid stockholders of record at the close of business Dec. 15, 1937, and is subject to the Wisconsin State Dividend Privilege Tax of 2½ per cent which will be deducted and paid at the source to the Treasurer of the State of Wisconsin.

The treasurer's report for the first quarter of the company's fiscal year shows that the earnings as of Oct. 31, 1937, closing the first quarter, are \$152,479.45, after reserve for normal State and Federal income taxes, but without provision for undistributed profits tax. This is the equivalent of 38 cents per share on the 400,000 shares of \$5 par common stock.

Willys-Overland Motors, Inc., has announced that the regular quarterly dividend of 15 cents a share on \$10 preferred stock will be paid Jan. 1 to holders of record Dec. 15. Total distribution will be \$48,116, bringing the total amount paid since reorganization to \$234,823.

Houdaille-Hershey Corp., has declared a dividend of 37½ cents per share on Class B stock, payable Dec. 15, 1937 to stockholders of record Dec. 6, 1937.

The regular quarterly dividend of 62½ cents per share on Class A stock was also declared, payable Jan. 3, 1938, to stockholders of record Dec. 20, 1937.

The board of directors of United Specialties Co. has declared a dividend of 35 cents per share on the common stock of the corporation, payable Dec. 24, 1937, to stockholders of record Dec. 14, 1937.

The directors of Yellow Truck & Coach Mfg. Co. have declared a dividend of \$14 a share on account of accumulations on the 7 per cent cumulative preferred stock. The dividend is payable Dec. 23, 1937, to stockholders of record Dec. 15, 1937.

On Nov. 17, 1937, a dividend of \$1.75 a share was declared which is also payable Dec. 23, 1937, to stockholders of record Dec. 15, 1937. Including these declarations and payments totaling \$5.25 per share previously made this year, a total of

\$21 a share will have been paid on the 7 per cent cumulative preferred stock during 1937. Dividends in arrears on this stock at Dec. 31, 1937, will amount to \$14 a share.

A special dividend of 50 cents a share on common stock, payable Dec. 23 to stockholders of record Dec. 10, has been declared by Goodyear Tire & Rubber Co. directors. The additional distribution brings the total dividends paid on Goodyear common stock this year up to \$2.50 per share.

With 1,999,082 shares of Goodyear common stock outstanding, the special dividend means approximately \$1,000,000 cash disbursement.

Aircraft Output Up 25%

Aircraft manufacturers produced 2757 airplanes in the first nine months of 1937, a 25 per cent increase over the corresponding part of 1936, according to a study made by the Bureau of Air Commerce, Department of Commerce.

Of the airplanes produced during this period, 1821 were for domestic civil use; 484 for delivery to the military services, and 452 for export.

Among those for domestic use, monoplanes led biplanes 1676 to 144. Among airplanes of various sizes the most numerous were two-place closed landplane monoplanes, of which 1240 were produced for domestic civil use.

In addition to the 2757 airplanes, manufacturers produced 22 gliders and 9 lighter-than-air craft.

40 Years Ago

with the ancestors of
AUTOMOTIVE INDUSTRIES

French Motor Shares (Part 2)

In contrast with the speculative balloon which was raised in England, and which courts, promoters and shareholders are now trying to drag back to solid earth, the French method is most commendable. These companies are capitalized on a fair working basis, so that liberal dividends can be earned, and more capital readily obtained as required.

The solid development of the French industry will undoubtedly be repeated in the history of the industry in this country. A substantial groundwork is already laid, and the superstructure can now be reared with confidence. Open sesame.—From *The Horseless Age*, October, 1897.

Automotive Industries

New Chevrolet Taxicab

Chevrolet has announced its 1938 taxicab model with a 127-in. wheelbase. The body is a Fleetwood product of Fisher uni-steel construction and is offered in two sedan styles, plain back or with trunk. Doors have been made unusually wide.

A full-length, full-height partition separates the front and rear compartments and is designed so that the various types of taxi meters may be attached to it. Full width sliding windows in the upper part of the partition are made of safety glass.

The taxicab frame is of box girder construction. Single acting shock absorbers are installed at the front and rear; semi-elliptic springs are also used both front and rear.

Wheel & Rim Association Moves

The National Wheel & Rim Association has moved its headquarters from Cleveland to Detroit. The new office is at 63 W. Milwaukee Ave.

E. S. Ingham, formerly with McCord Radiator Co., has been appointed secretary and general manager. Prior to his connection with McCord, Mr. Ingham for 12 years was in charge of distributors' sales for Budd Wheel Co.

Tractor Statistics

Show 31% U.S. Wheel Type Units Equipped With Rubber Tires

Thirty-one per cent or 60,401 of the 193,947 wheel type tractors manufactured in the United States in 1936 were equipped with rubber tires at the factory; in 1935, 19,700 or 14 per cent of the 138,084 wheel type tractors produced were similarly equipped, according to statistics.

Detailed statistics for domestic manufacture of tractors in 1935 and 1936 are as follows:

Wheel Type:	Number	Value*	1935
Belt HP under 25.....	6,571	3.7	
Belt HP 25 to 29.....	4,056	3.1	
Belt HP 30 and over....	21,114	17.6	
All purpose, all sizes...	106,343	59.0	
			138,084
Tracklaying	18,774	37.1	
Garden	4,273	0.8	
Total	161,131	121.3	

Wheel Type:	Number	Value*	1936
Belt HP under 25.....	12,658	7.2	
Belt HP 25 to 29.....	4,791	3.8	
Belt HP 30 and over....	21,619	17.5	
All purpose, all sizes...	154,879	92.3	
			193,947
Tracklaying	27,299	54.6	
Garden	5,939	1.1	
Total	227,185	176.5	

* Millions of dollars

Ten Months' New Car Dollar Volume \$2,443,400,000

Estimated dollar volume of new passenger car registrations for the month of October moved down approximately 10 per cent from the previous month's figure to \$163,800,000.

Chevrolet, Ford, and Plymouth registrations represented 52.76 per cent of the October total, a decline of roughly 11 per cent from the September position. New registrations in the price class \$751-\$1,000, however, rose about 14 per cent in October.

U. S. New Passenger Car Registrations and Estimated Dollar Volume
by Retail Price Classes*

	New Registrations				Estimated Dollar Volume			
	October †		First Ten Months ††		October †	Per Cent of Total	First Ten Months ††	Per Cent of Total
	Units	Per Cent of Total	Units	Per Cent of Total				
Chevrolet, Ford and Plymouth	104,077	52.76	1,776,885	57.77	\$73,800,000	45.05	\$1,233,700,000	50.49
Others under \$750.....	3,035	1.54	46,474	1.51	1,700,000	1.04	26,400,000	1.08
\$751-\$1,000.....	71,382	36.18	1,069,884	34.78	63,900,000	39.01	937,200,000	38.36
\$1001-\$1500.....	16,541	8.38	158,251	5.15	19,700,000	12.03	189,900,000	7.77
\$1501-\$2000.....	1,299	0.66	12,018	0.39	2,100,000	1.28	20,400,000	0.84
\$2001-\$3000.....	820	0.42	10,282	0.33	2,100,000	1.28	26,900,000	1.10
\$3000 and over.....	117	0.06	2,151	0.07	500,000	0.31	8,900,000	0.36
Total.....	197,271	100.00	3,075,945	100.00	\$163,800,000	100.00	\$2,443,400,000	100.00
Miscellaneous.....	120		1,189					
Total.....	197,391		3,077,134					

* All calculations are based on delivered price at factory of the five-passenger, four-door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes.

† Does not include data for returns from Wisconsin.

†† Does not include data for returns from Wisconsin for July, August, September and October.

Automotive Metal Markets

Sheet Mills Report Improvement in Release for Body Stock; Strip Operations Continue at 35 to 40% Capacity

Mild improvement in releases for body stock is reported by sheet mills. Much of this is of the filling-in sort, but here and there somewhat more encouraging tonnages are ordered shipped. Call for fender stock is light, but no more so than it has been for the past month, and strip mills continue to operate at between 35 and 40 per cent of capacity. Bolt and nut manufacturers report routine small lot takings by automobile manufacturers.

While ordinarily automotive consumers of steel pay little attention to the price movement of tin plate, announcement that the steel mills have reaffirmed prices for that commodity, to remain in effect over the first nine months of 1938, came in for considerable attention, denoting, as it does in the opinion of many buyers, that steel producers do not intend to deviate from their stand-pat price policy. The bulk of 1937 tin plate consumption was contracted for at prices about 10 per cent lower than those which now have been announced for 1937, so that these, in a way, represent an actual advance.

From day-to-day adjustments in the operation of individual mill units, not only to afford the greatest possible economy in production under present conditions, but also to permit necessary repairs and reconditioning here and there, are reflected in this week's rate of 27.5 per cent of employed ingot capacity reported by the American Iron and Steel Institute. Finishing mills are converting primary steel at a higher rate than the prevailing ingot output, drawing upon reserve stocks, so that the low rate of employed ingot capacity does not necessarily imply a further recession in steel takings by consumers.

In the copper market, the scales have turned. A day after one custom smelter had cut the price for electrolytic to 10 cents, no copper was to be had at below 10½ cents. This was due to the fact that, as soon as the cut to 10 cents became known, the custom smelter, who had announced the reduction, was offered orders many times his intake in sight. As soon as the moderate size tonnage that he had to offer at 10 cents, had been disposed of, the lid went on. Meanwhile, considerable in the way of foreign business had been attracted, and business was done at 10.35 cents. Mine producers

continued to quote 11 cents to domestic buyers, while custom smelters named 10½ cents. In the "outside" market 10¾ cents was asked. Obviously a very large tonnage could have been sold at 10 cents, much more than first hands wanted to see pass into speculative channels.

Reports that M. Sengier, a director of the Katanga Company of Belgium, leading South African producer, was in New York for a parley with American copper interests, were pooh-poohed by some in the market, while others voiced the belief that further contemplated curtailment of output by American producers would call for an understanding with their competitors in foreign markets, and that this might be the reason for the Belgian's visit at this time.

Tin also staged a turnaround, spot Straits being quoted at 44¾ cents, when the market opened this week, an advance of approximately \$67 a ton over the price at which it could have been bought on the day after Thanksgiving. There is still talk of a further shifting of production quotas in favor of producers, but improvements in the general commodity situation in London was the immediate impetus for the advance. Later in the week, the market eased off a shade, but, nevertheless, gave definite evidence of having moved into higher ground.

Zinc and lead showed a steadier tone.—W. C. H.

Motor Carrier Hearings Delayed

The Motor Carrier Bureau of the Interstate Commerce Commission has not as yet arranged hearings in connection with the investigation it has instituted of regulation governing sizes and weight of motor vehicles of common, contract and private carriers.

Known as Ex Parte No. MC 15, the investigation has been instituted for the following purposes, according to the ICC order:

1. To enable the Commission to make a report under the provisions of section 225 on the need for Federal regulation of the sizes and weight of motor vehicles and combinations thereof, and

2. To enable the Commission to prescribe reasonable requirements under the provisions of section 204 of the act as to the sizes and

weight of motor vehicles and combinations thereof insofar as they affect the safety of operation.

The inquiry is taken to indicate the ICC belief that its supervision under the Motor Carrier Act supersedes State regulation of sizes and weights with respect to safety.

The American Trucking Associations, Inc., has announced that it has assisted truckmen in instigating cases in two Federal courts on this subject and the ICC intervened in each case.

White Speeds Output

Starts Full-Time Production in New Bus Body Building

The White Motor Co. this week began full-time production in its new bus body plant in Cleveland, just completed at a cost of \$425,000. According to J. N. Bauman, vice-president in charge of sales, the plant has started work on assembling 20 of the new model aero-weight aluminum city transit coaches recently ordered by the Triboro Coach Corp., New York.

Part of the \$2,000,000 expansion program under way at White's plant in Cleveland, the new bus body building provides 150,000 sq. ft. of floor space and has a capacity for production of 1200 to 1500 coaches per year. It now employs 165 men, to be increased to 225 men at peak production.

In addition to a considerable amount of foreign business, White has received a number of large fleet orders recently including orders from the City of San Francisco; Consolidated Bus Lines of Passaic, N. J.; Chicago, Aurora & Elgin railroad; the Los Angeles Railway Co.

New Goodrich Diesel Batteries

A complete line of specially constructed batteries for Diesel starting service has been announced by the B. F. Goodrich Co., Akron. In the line are four 6-volt types, two 8-volt types and ten 12-volt types.

Eight of the batteries are of conventional construction and eight built with the Kathanode construction. Port Orford Cedar separators are used in the conventional type. In the Kathanode type flexible spun glass Kathanode retainer mats are used on both sides of the positive plates.

All batteries, except the 8-volt types, are assembled in hard rubber cases. The 8-volt types are assembled in hard rubber jars and wood cases. Connectors are of solid lead, except

the 8-volt types, which are of flexible copper with lead coating to prevent corrosion.

Cell covers are made of reinforced hard rubber, terminal posts are of the braced type, with rubber gasket seals and locknuts to prevent acid seepage, allowing for vibration of plates without causing damage. Splash proof vents are used and ample sediment space provided to prevent battery failure as a result of short circuits arising from an accumulation of sediment touching the plates.

SAE Hears Diederichs

Autocar Metallurgist Discusses Heat Treatment Fundamentals

At the December meeting of the Society of Automotive Engineers, Philadelphia Section, held at the Engineers Club on the evening of Dec. 8, W. J. Diederichs, metallurgist of the Autocar Co., gave a talk on automotive metallurgy.

Mr. Diederichs dealt mainly with the fundamentals underlying the heat treatment of steel parts. He explained that the term "metallurgy" correctly applies to the refining of metals from their ores, and that the science relating to the improvement of the mechanical qualities of steels by heat treatment should properly be called physical metallurgy.

The speaker said that when pure iron is heated, its grain structure changes at certain definite temperatures, which are called critical temperatures. At the highest temperatures, the principal constituent is austenite; at a somewhat lower temperature martensite appears; this is followed at a still lower temperature by troostite, and finally by sorbite. The change from one phase to another takes place at a definite temperature, but takes some time. Addition of carbon to the iron has the effects of lowering the various critical temperatures and of increasing the time required for the change from one phase to another, and carbon is said to act as a brake on the transformation.

If the metal can be cooled rapidly enough so that the transformation does not have time to be completed, then the grain structure produced by the higher temperature is retained in part at the lower temperature and thus the hardness and such other mechanical properties as the tensile strength and the elongation can be varied almost at will by heat treatment. That heat treatment has very little effect on low-carbon steels is

due to the fact that with these steels the transformation is completed in such short time that it is impossible to cool the steel below the transformation point before the change has been completed.

Mr. Diederichs also explained clearly the conception of a solid solution, which plays an important part in heat-treatment phenomena. At high temperatures the iron and carbon are in the state of a solid solution. As the temperature is lowered the solubility of free ferrite in austenite decreases and some of it precipitates out.

The speaker also explained the tempering process and said its object is to increase the ductility (indicated by the elongation of the test specimen) at the expense of some loss in tensile strength and hardness.

A special problem is presented when both high hardness or wear resistance and high ductility are wanted, as in the case of parts which are subjected to both frictional wear and shock. This requirement can be met by carburizing low-carbon steel and quenching. During the carburizing process, carbon is absorbed by the surface layer, and upon quenching this assumes great hardness on account of the high carbon content, which delays the transformation. The original material has only a very small carbon content and the core of the piece, therefore, is not affected by the quench, so that

it retains its ductility, which may even be increased by reheating and quenching at a temperature below that of the original quench, which does not affect the hardness of the case.

W. C. Cowling Resigns

W. C. Cowling, for several years head of the sales department of Ford Motor Co., has resigned to enter private business. Mr. Cowling had been with the Ford company for 23 years, rising to the head of the traffic department from which he was transferred to head the sales organization.

He said he had not determined which of several fields of industry he would enter but would make such determination very soon.

UAW Seeks Elections

(Continued from page 825)

work if necessary, where it can be done without reducing wages below decent living standards; to stop decentralization of industry; to seek immediate release of all WPA jobs possible for the state; make unemployment compensation benefits date from Jan. 1, 1938, instead of July 1, 1938; grant moratorium on workers debts to corporations for period of layoff; and to call a conference of union and business leaders to work out agreement for spreading work.

New Truck Registrations* Top '36 by 3.8%

The ten months' total number of new truck registrations this year is out in front of the 1936 mark by 19,727 units. Comparison of the October total with that of the preceding month shows a decline of a little more than 25 per cent.

New Truck Registrations*

	October 1937	Sept. 1937	October 1936	TEN MONTHS		Per Cent Change, 10 Months, 1937 over 1936	Per Cent of Total Ten Months	
				1937	1936		1937	1936
Ford	10,103	15,791	11,363	174,967	158,336	+ 10.3	31.66	29.70
Chevrolet	10,511	16,252	7,752	162,701	177,478	- 8.3	29.43	33.30
International	6,367	6,460	6,529	66,039	60,752	+ 8.9	11.95	11.40
Dodge	5,042	6,346	7,389	56,017	74,718	- 25.0	10.13	14.02
G. M. C.	3,165	3,496	2,736	38,714	23,523	+ 64.8	7.00	4.41
Plymouth	950	1,364	84	12,012	2,306	+ 422.0	2.17	.43
Diamond T.	474	623	959	7,225	7,136	+ 1.3	1.31	1.34
White	566	391	612	5,177	4,750	+ 9.0	.94	.89
Mack	432	406	506	4,821	3,370	+ 43.0	.87	.63
Studebaker	261	350	343	4,704	2,827	+ 66.3	.85	.53
Terraplane	261	380	58	4,507	1,636	+ 175.0	.82	.31
Reo	275	249	516	3,724	3,633	+ 2.6	.67	.68
Federal	163	128	255	2,107	2,436	- 13.6	.38	.48
Autocar	194	183	159	1,875	1,103	+ 70.0	.34	.21
Brockway	129	94	155	1,372	1,456	+ 5.6	.25	.27
Indiana	91	111	191	1,233	1,433	- 14.0	.22	.27
Diveo	96	104	88	1,044	839	+ 24.7	.19	.16
Stewart	79	75	133	1,022	1,088	- 5.8	.18	.20
Willys-Overland	55	75	252	849	2,132	- 60.2	.15	.40
Stutz Pak-Age Car	30	46	—	560	—	—	.10	—
F. W. D.	42	26	19	380	260	+ 46.0	.07	.05
Sterling	20	31	36	285	206	+ 38.3	.05	.04
Kenworth	21	9	—	122	—	—	.02	—
Schacht	—	3	—	40	—	—	.01	—
Miscellaneous	106	123	179	1,266	1,616	- 21.6	.24	.30
Total	39,433	53,116	40,314	552,761	533,034	+ 3.8	100.00	100.00

*Less Wisconsin for July, August, September, and October.

Measuring Heat of Gases at High Temperatures

New determinations of the specific heats of gases at high temperatures are being made at the National Physical Laboratory at Teddington, England. The method adopted is based on the well-established proportionality between the square of the speed of sound and the ratio of the specific heats of the gas. Satisfactory results for this "velocity of sound" method have already been obtained for the ratio of the specific heats of carbon-monoxide at temperatures up to 1300 deg. C., and subsequent work has been concerned with carbon dioxide.

Part of the apparatus employed in the research work is shown by the drawing herewith. A stationary train of sound waves was generated in a heated tube by quartz crystals vibrating piezo-electrically at any

one of three known frequencies. The experimental tube, made of pythagoras (a refractory oxide) and wound outside with nichrome tape, constituted a furnace in which the temperature of the carbon dioxide was varied up to 1000 deg. C. The effective length of the tube was varied by changing the position of a reflector by means of a rack and pinion with vernier adjustment, the disk reflector and its associated piston being also made of pythagoras and having a thermocouple at the piston for the measurement of gas temperature. Sealed by Wood's metal to the lower end of the tube was a chamber containing three quartz crystals, of different fundamental frequencies, mounted on a disk so that each in turn could be brought into position at the open lower end of the tube and piezo-electrically excited. The speed of sound in the tube was deduced from half-wave length determinations, the latter being measured by the distance traversed by the reflector from one resonance point to the next. It was found that the latter were very accurately indicated by a succession of sharply defined maxima in the plate current of the oscillator actuating the quartz crystals.

As a preliminary check on the functioning of the apparatus as a whole, tests at three frequencies and three widely different temperatures were carried out on the gas argon, for which, being monatomic, the ratio between the specific heats at constant pressure and constant volume should be independent of temperature and have the value 5/3 exactly. The mean of three values obtained from the apparatus was, in fact, 1.666 after correction for an impurity of 0.5 per cent of nitrogen present in the argon. Tests on carbon dioxide were accordingly made with confidence at a number of temperatures over the range from 0 deg. C. to 1000 deg. C. and at frequencies of sound generation of about 8, 14 and 19 kilocycles per second.

In the accompanying table the results obtained by the method described in the foregoing are compared with the specific heats calculated from spectroscopic data.

The concordance between the spectroscopic values and those obtained

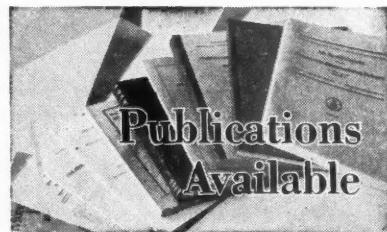
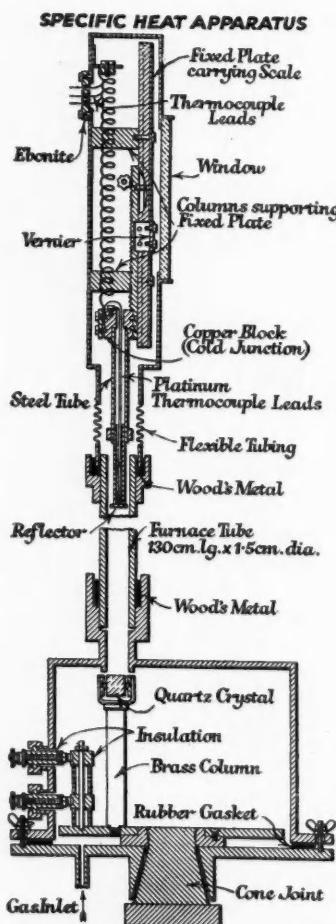
by the velocity of sound method is noteworthy. In addition, it is worth remarking that no change in the speed of sound in carbon dioxide could be detected over the frequency range from 8 to 19 kilocycles per second, from which it was concluded that the time of relaxation of the carbon dioxide molecule is very small. On the other hand, it was found that the absorption of sound

TABLE XI.—*Specific Heat of Carbon Dioxide.*

Temp. Deg. C.	Speed of Sound, Meters per Second.	Ratio of Specific Heats γ	Specific Heat at Constant Vol. (Cv.) Cals. per gramme molecule at 1 at- mospheric pressure.	
			Vel. of Sound Method.	Spectro- scopic Method.
0	258.3	1.310	6.62	6.67
200	331.5	1.231	8.65	8.49
400	390.5	1.198	10.06	9.80
600	412.3	1.184	10.81	10.64
800	488.6	1.176	11.30	11.21
1000	530.6	1.169	11.76	11.61

in carbon dioxide increases so markedly with frequency that measurements were made only with difficulty at 19 kilocycles per second, while at higher frequencies, up to 50 kilocycles per second, the sound absorption was so great as to prevent any indication of resonance as the reflector was moved along the tube. From observations of the absorption coefficient it was possible to deduce that the time of relaxation of the molecule of carbon dioxide is in the neighborhood of 0.8×10^{-6} second.

—Engineering, Nov. 19.



New literature issued by the Procunier Safety Chuck Co., Chicago, includes a catalog on Procunier universal tapping machines and a bulletin on Procunier tapping heads.*

"The Contour Machining Handbook," a revised edition of an earlier handbook on contour sawing has been issued by Continental Machine Specialties, Inc., Minneapolis, Minn. It includes much valuable data including tables listing the correct machining speeds for either sawing or filing 48 materials.*

The International Nickel Co., Inc., is offering a pamphlet listing and briefly describing its current literature on production and industrial applications of the nickel alloy steels, nickel cast irons, and nickel alloyed non-ferrous castings.*

Latest folder brought out by G. S. Blakeslee & Co. contains information covering specific uses of solvent degreasing machines and the process.*

The Atlas Press Co., Kalamazoo, Mich., has published a new catalog describing its line of shop equipment.*

The DeVilbiss Co., Toledo, Ohio, has announced the release of a new general catalog covering complete spray painting equipment for interior and exterior painting, automobile refinishing and equipment for

automotive service, as well as air and fluid hose and other DeVilbiss equipment.*

A manual on lathe operation, including machinists tables, is available for the price of \$1 from the Atlas Press Co., Kalamazoo, Mich. Data on fundamental theory as well as information on operating procedure is included.

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

J. B. Senderens

One of the pioneers of hydrogenation by catalysis, Jean Baptiste Senderens, died at Barbachen in the High-Pyrenees on Sept. 26. He was born there on Jan. 27, 1856. M. Senderens was a correspondent of the Chemical Section of the French Academy of Sciences.

After completing his studies at the Garaison College he entered the Catholic Institute of Toulouse and was received by Filhol in his laboratory. In 1882 he founded a school of science at the Catholic Institute, of which he became professor and later a dean.

Senderens is best known to the industrial world through the work on the hydrogenation and dehydrogenation of hydrocarbons with the aid of finely divided metals such as copper and nickel, which he conducted in collaboration with Sabatier from 1892 on. They found that, using nickel as a catalyst, hydrogen may be readily added chemically to non-saturated hydrocarbons, aromatic hydrocarbons, aldehydes, ketones, phenols and nitrogen compounds.

Senderens thus drew public attention to the practical value of catalysis as an industrial process.

Correction

A number of typographical errors occurred in the article on Automotive Gear Design by R. S. Drummond in our issue of Nov. 27.

The reference to the illustration of Packard practice with respect to tooth modification, at the center of page 776, should have been Fig. 4 instead of Fig. 5.

In Fig. 5, in the formula for the chordal tooth thickness the equals sign was omitted. The formula should have read—
Chordal tooth thickness = Cir. T.T. — C

In the equation for the addendum correction for helical gears an exponent was omitted and this equation should have read—

$$(Nor. Cir. T.T.)^2 \times (\cos \text{Helix Angle})^2$$

$$A = \frac{4 \times P.D.}{B_1 + B_2}$$

In Fig. 8 "plus" signs were missing from the equations for the maximum outside diameters of the pinion and gear without interference. The equations should have read:

$$B_1 = \sqrt{(a_1)^2 + (C \sin \alpha)^2}$$

and

$$B_2 = \sqrt{(a_2)^2 + (C \sin \alpha)^2}$$

On page 776, second column, third line, the limit in the reduction of the chordal thickness is given as 0.0001 in. This should have been 0.001 in.

Puerto Rican Purchases Up 12%

Puerto Rican purchases of automobiles and trucks from manufacturers in the United States during the first 10 months of the current year were 12 per cent greater than in the same period a year ago, according to a statement by the Puerto Rican Trade Council.

"Sales of motor vehicles to the Island totaled 3146 units during the 10 months, and were valued at \$2,150,000, a gain of 15 per cent over the 10 months in 1936," the report states. "Shipments of passenger cars amounted to 2226 units, with 89 per cent falling in the \$850 and less classification. The Island's truck purchases totaled 871 units, with 84 per cent rated at 1 ton and over."

Books

of automotive interest

PETROLEUM FACTS AND FIGURES, Fifth Edition (1937). Published by American Petroleum Institute, 50 West Fiftieth Street, New York.

This is the first new edition of this work since 1931. Effort has been made to include in it all suitable material regarding the petroleum industry. The format has been changed to permit of inclusion of additional statistical data and of illustrations, this being the first edition containing charts and pictorial graphs.

The subject-matter is divided into eight sections. The first, dealing with utilization, shows various uses to which petroleum and its products are put, with consumption figures by years. The chapter reveals that more than 1,750,000,000 barrels of petroleum products are consumed annually by world industries, transportation, farms and homes. The United States consumes 62 per cent of the total.

The second chapter, covering production, shows the output of crude oil by continents, nations, states, and fields since production records first were kept. Allied subjects, such as petroleum reserves, deep drilling records, crude oil prices, and production of other products also are presented.

Transformation of raw materials into usable products is considered in the third chapter, which deals with refining. An insert presents an up-to-date list of the principal petroleum products, which was prepared with the cooperation of refinery technologists throughout the country. Transportation of petroleum and its products to consuming agencies is covered in the fourth chapter, markets and prices in statistical tables of the fifth. In the sixth section comprehensive data on taxation disclose how heavily the industry and its customers are levied upon for the support of government.

The seventh or general section presents facts and figures on the industry's capital investment, pay rolls, earnings, etc. The eighth section, comprising an appendix presents tables of petroleum exports, imports, production, consumption, refining operations, etc., the personnel of the Institute's officers, board of directors and standing committees, a list of petroleum and allied trade associations, a list of Institute technical and other publications, and an index.

Which Way?



WHEN Mr. Sloan addressed the Association of Life Insurance Presidents in New York on Dec. 3 his voice reached executives whose companies manage \$20 billion in invested reserves, whose loans to policyholders in 1936 approximated \$3.2 billion, and whose annual income in the form of new and renewal premiums is around \$3 billion. These institutions are now, in addition, larger holders of government bonds than the national banks. Because of its timeliness, the importance of the speaker in the affairs of our own industry, the importance in the financial life of the nation of the group addressed, the importance of the questions involved, and the obvious sincerity behind its reasoning, we present herewith the full text of Mr. Sloan's speech, eliminating only necessary introductory matter attending its verbal presentation.

WE have been passing through four years of an advancing industrial trend. Employment has been rapidly increasing. The production of goods and services has been expanding on a broad front. Payrolls and hours of employment have been mounting. Losses have been turned into profits and profits have been generously distributed—still further adding to the purchasing power of the community at large. The whole national economy has followed the usual course of a normal recovery movement. This has happened many times in the past. It undoubtedly will happen many times in the future. It is a natural, and, to an important degree, an irresistible movement. It has been accomplished without undue strain on our credit structure and, personally, I believe without any unreasonable over-valuation of security prices in general—certainly not as a result of undue speculation.

Industrial production has not yet reached the records of previous upswings. And this has always happened in the past before a change in the trend has taken place. There is available a tremendous latent demand on the part of the masses for more goods and services to add to the comforts and pleasures of life and make possible a higher standard of living for all. This is true not only because of the shortage still resulting from the depression, but from the more fundamental standpoint as well. Our people are entitled to more. The component parts for the production of these needed goods and services are available in ample quantities, and right within ourselves—raw materials of all kinds; skilled and unskilled labor; highly efficient manufacturing plants—all are at hand, as well as an unrivaled manufacturing technique to produce, from these component parts, useful articles to supply the demands for more things for more people, everywhere. Out of such a picture, it seems to me there clearly stands the indisputable fact that the recovery movement, which began to assume control of our national economy in

**Business, the Nation and Government,
Insurance Men Asked Alfred P. Sloan, Jr.,
Chairman of General Motors.
Here are his answers.**

the summer of 1932, could not have run its normal economic course as measured by the record of similar events in the past and judged by all the circumstances as they now exist. Such was the picture of yesterday!

What of today? Things have changed, and over night! Security values have fallen by something like 40 per cent. Steel production—a primary index of industrial activity—has dropped by two-thirds. Industrial production in many other lines, is being rapidly curtailed by shortening hours and reducing the number of workers. Thus payrolls are shrinking, and unemployment is increasing. Car loadings are declining. Automobile production—perhaps the most important index of industrial activity because of its influence on so many other production groups—is falling off.

Now, what has brought about such a contrast between the picture of yesterday and the prospect of today? I believe the answer to be reasonably clear. There has been superimposed upon the normal course of the recovery movement, certain influences

—some due to our national economic policies and others, psychological in nature—which have resulted in not only arresting but actually reversing the normal trend of the recovery movement. I am quite convinced that in no sense of the word is there a new depression, as such, getting under way. I am, however, persuaded that it may generate into a real depression if we continue to pursue the course that we have been following. What we are at the moment experiencing, I believe to be a serious interruption in our recovery from the old depression. If that be true, there is not much use of attempting to forecast whether the change will be long and serious or short and moderate, for it may be either. We might better direct our intelligence and our experience toward determining and then eliminating the fundamental causes of the slump in which we now find ourselves.

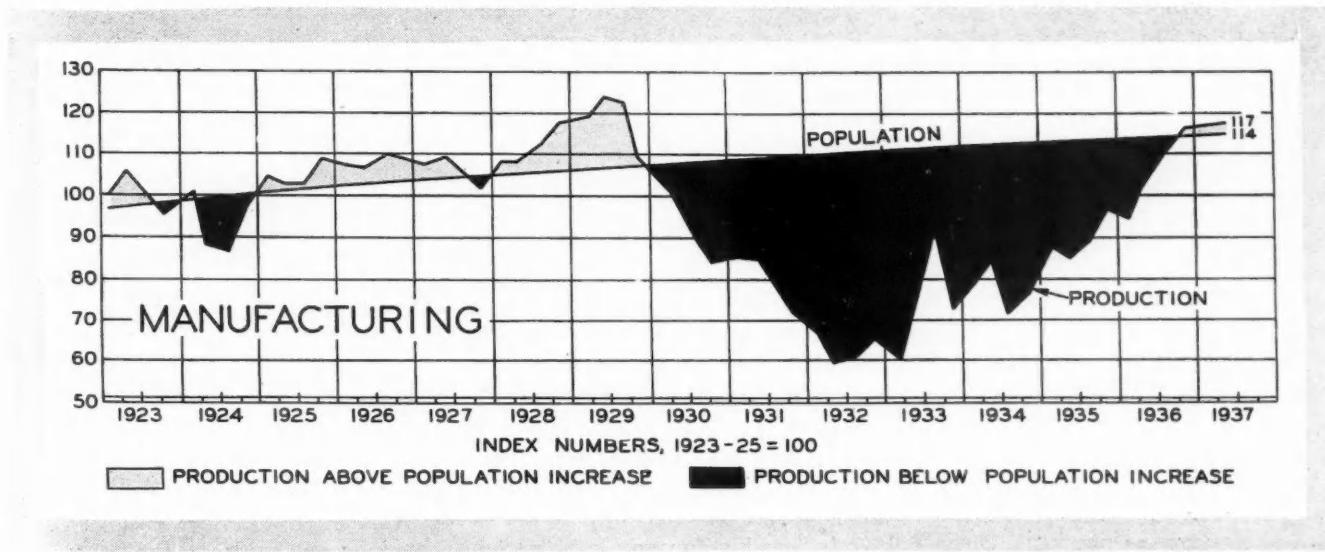
The problem, if it is to be met at all, demands the aggressive attention of agriculture, industry, finance, and government. All are involved in its solution. It demands cooperation,

and to the normal definition of "co-operation" as "working together for a common cause," I add: "with confidence in each other and with mutual respect." Without that, the whole effort falls of its own weight. To delay may be dangerous to all concerned.

Now, if you should ask me what I regard as the most elementary problem, speaking in an economic sense, that industry has to deal with, I should be inclined to say that it is nothing more or less than the technique of distributing its productivity among the component parts directly involved therein. I should define these "component parts" as the workers; the owners, represented by management; the consumers; the government, and the future—the last named being a "silent partner" in which all the others have an important interest from the standpoint of their progress with stability.

The share of the worker's group is represented by the hourly wage and the number of hours of work. In other words, the annual income. The consumer's position is deter-

Latent Demand



Charts: Courtesy National Industrial Conference Board

To illustrate Mr. Sloan's emphasis on the great reservoir of latent demand which still exists we have introduced these charts showing the disparity between population growth and manufacturing . . .

mined by the price level—the price of goods and services. The owner's group by profit and its realization in dividends or their equivalent or accrual on investment. The government, by the part it levies, in the form of taxes, for its services in maintaining an orderly and an equitable opportunity for accomplishment. To the future, must be allocated a certain share in the form of earnings retained to insure to the enterprise the essential stability over the years, and to provide for the necessary expansion in production—always more goods and services essential to our national objective of an ever-increasing standard of living. Still further, and to the same point, to accelerate that increase by providing the enterprise with better instruments of production made possible through an ever-advancing technology, resulting in lower costs and selling prices.

Now, if we combine these various constituents into one large group, we have the entire community—all are involved. We find, moreover, that many belong to more than one group as well as to several different groupings. For instance, workers are consumers, and they must be made so to an ever-increasing degree. Owners are likewise consumers. They frequently are workers, as well. The position of each group is dependent upon a proper economic balance being maintained at all times among all the groups and through all the multiplicity of groupings. That is the keynote of our whole American industrial system. As a matter of fact, that balance is so vital that I do not think it is an exaggeration to say that the future of American industry, involving the development of a continually better standard of living for all—especially for the lower strata of our population—the perpetuation of the capitalistic system, and the maintenance of democracy itself, depends very largely upon the intelligence with which we distribute the productivity of industry among these various groups. And in dealing with this vital problem we must bear in mind that there is a constant shifting of position taking place among them. This must be recognized by a continuous adjustment. There must be the maximum of flexibility; otherwise the system gets out of balance, resulting in declining productivity and even chaos and disintegration. To freeze any component part tends ultimately to freeze the entire system. Out of such situations come our periods of unbalanced prosperity and resulting depression. The maximum productivity, the

greatest benefit for all—which certainly should be the objective of the joint enterprise—can only be attained and preserved through intelligent cooperation and a recognition on the part of each group, of its own responsibilities, together with a willingness to respect the equitable rights of all other groups.

Such is what we might call "Industry's organic structure." Now what is the philosophy that should determine the relationship among these component parts, if we assume our objective to be a continuous and ever-increasing flow of goods and services so that more people will have more and more things, thus promoting material and social progress with stability?

Production a Requisite

First, we must recognize that our objective necessitates a constant increase in the physical volume of production. Too many seem to think that, in some way or other, we can have more by magic. On the contrary, that objective can only be accomplished by the laborious task of obtaining the essential materials from the mines, from the forests, and out of the ground, and carrying them through the various processes of fabrication until they reach some form useful to mankind. As a nation, we still have to learn that neither more leisure nor a fantastic distribution of property, nor higher prices, but on the contrary, more work done more efficiently is the only possible approach to the highly desirable objective that we have in mind.

Now, if we are to have more things, we must have more customers to consume those things. Every owner, every worker, every one, everywhere, must be made into the greatest possible consumer. That being the case, let us look at the economic position of the worker's group in industry's scheme of things. Suppose we increase the worker's share through increased wages, in the effort to increase the capacity to buy. Manifestly, the consumer must pay more and the owner must take less, or both together, must make up the difference. The government tends never to take less, but always more.

Now, a survey of the profit position of American industry over the business cycle demonstrates that, in general, the return on the capital employed is relatively so limited that it is impossible for any substantial increase to be allocated to any group without being reflected in increased prices to the consumer group—the

consumer must pay. Higher prices mean a reduced flow of goods for the reason that there are fewer consumers at higher prices. If the hours of the workers are reduced with the same rate of pay, the economic result is exactly the same. And even if we assume that the increased income to the workers is equivalent to the increased selling prices, there is still a loss in the consumption and production of goods because the increased income is never uniformly distributed.

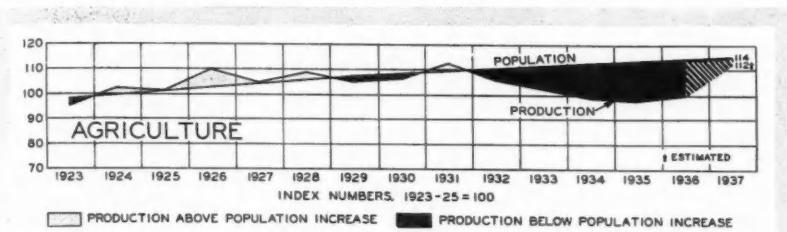
The point I want to make is that the only sound step toward our objective is to do those things that reduce real costs. This can only be accomplished by increased efficiency. If the productivity of any industry is on a high plane of efficiency, from the standpoint of its technological advancement, such for instance, as is the case in the automotive industry, the participation of the worker group can very properly be higher than the general average. It might be well said that the excess of the wage level over the average is in direct proportion to the higher standard of technology. But there is a limit beyond which that cannot be justifiably carried, for rather than to go beyond that economic limit it is better to reduce prices within the reach of a greater number of buyers, thus stimulating production and increasing employment with a greater flow of goods.

Unfortunately, too many hold that technological unemployment, resulting from increased efficiency or a reduced labor content in goods, is one of the great dangers of our industrial systems. As a matter of fact, the contrary is true. Right there lies industry's greatest opportunity for accomplishment. The progress and stability of our industrial system is measured by its ability to capitalize technological progress in the interests of all groups. Any contribution, be it in the form of a better machine or improved operating technique, even if the subsequent result is to apparently reduce employment at the source, makes a contribution toward a higher standard of living because it means lower prices, stimulated consumption and added overall employment somewhere within the industrial area.

A Look to the Future

Then we must give thought to the future. Part of our productivity should be set aside in the form of capital, to take care of the periods of adjustment that are bound to occur no matter how intelligent we

Latent Demand



... Population growth and agricultural production

may be. And having always in mind an increased flow of goods, additional capital must be made available for the expansion of our plants and the provision for better instruments of production in line with our ever-improving technology.

Aside from the economic aspects of the problem, we have the psychological phase. This today is of vital importance. Willingness to accomplish, initiative and ability wherever it exists, must be encouraged and properly rewarded—not penalized and persecuted. We can not do these things that are so desirable by that approach to the principal agency which makes success possible.

Now, what has happened? How are we handling the great problem of the essential balance among the groups within industry? Let us see! First, many of the worker's groups—especially the ones earning the highest wages already—have received an important and rapid increase in their participation in industry's productivity. This has had to be reflected in a rapid increase in prices to the consumer, as well as in a reduced return to investors. As to the more poorly paid workers, relatively little has been accomplished. Thus prices in general have advanced more rapidly than purchasing power, taking the system as a whole, thereby prejudicing both consumption and employment. Not only that, but worker groups have been permitted to interfere with the flow of goods and services through costly strikes, thus reducing the physical volume of production. In some cases, minority groups have prevented the majority from working even on terms entirely satisfactory to that majority. In other respects they have demonstrated an utter lack of responsibility entirely out of keep-

ing with the obligations they have been granted as a component part of the industrial system. These things have resulted in questioning the fundamental rights of property and in promoting a lack of confidence, and fear as to the future ability of industry to perform and to earn.

It is the function of government to provide an orderly procedure which protects the equities of all concerned. It should not, through either laws or action, establish rules which promote unduly the interest of one group as against the others. And that is just what has been done.

Again, government exacts an ever-increasing charge for services rendered, thus taking by far too great a part of the national income. Even then it spends more than it collects, throwing doubt upon all prices through fear of inflation. Witness the unbalanced budget and the continually increasing burden of direct taxation on business. Naturally, prices rise—they can't do otherwise, for the consumer always pays. But unfortunately, all consumers can not pay, therefore, instead of an increase, we have a decrease in the flow of goods. There is less work to be performed. Government, desirous of further increasing its share, penalizes the future by exacting a charge through the ownership group against those who have the courage, the initiative and the ability to aspire to do a better job, both with respect to producing more goods, which requires capital, and also in producing those goods more efficiently through better instruments of production, which also requires capital. It inflates purchasing power in good times, and deflates it in bad times, hence increases the extremes of the business cycle and adds to the seriousness of periods of depression.

Witness the tax on undistributed profits!

That is not all, however! Government further exacts an ever-increasing share of the productivity of industry which investors directly receive, to the point where both the amount of available capital is unreasonably limited and its flow into industry is retarded. Witness the personal income tax! Again, through the enactment of another penalty tax, government freezes the natural flow of capital from one place to another, resulting in too high values in some cases, and too low values in others, and paralyzing, to an important degree, what ought to be a free and unrestricted movement of capital, both into and within the security markets. Witness the capital gains tax! Furthermore, where we ought to have the maximum flexibility in all things economic, at all times, we are rapidly developing a system of price controls, one after another—because one invariably leads to another—both within the industrial system and throughout the whole national economy. And, unfortunately, each of these controls apparently has no relationship with any other. The object supposedly is to stabilize prices and to protect purchasing power, but the result is to throw the industrial system farther out of balance and to endanger the equilibrium of the whole economic structure. The situations, which I have just outlined, are typical of the many influences that are adversely affecting industry's ability to perform, hence prejudicing the country's national economy.

Fundamentals Must be Understood

The record, however, is not by any means limited to these particular considerations. Within ownership and its management, we too often find a lack of understanding of the fundamental policies so essential to industry's progress with stability. Too often do we find lack of recognition of the equities of others with whom industry may be dealing. Too often do we find that an inequitable wage reflects a lack of appreciation of the fundamental fact that workers must be consumers to the maximum possible degree. Sometimes we find hours of work too long. Instances of an unreasonably severe task exist. In general, much too often do we find a lack of what might be called "industrial statesmanship"—a first requirement in the formation of sound managerial policies and an absolute necessity if an economically and socially desirable balance is

to be maintained among the component parts within industry's sphere of activity.

With all these things happening, is it any wonder that confidence in the future of American industry has been impaired and that the productivity of our industrial machine is rapidly declining, with the result that the normal course of recovery has not only been retarded, but reversed? The question of the moment is: What are we going to do about it? Certainly it involves a great emergency. Action is essential with a realistic approach on the part of the responsible agencies involved. From what I have attempted to outline, there naturally arise two separate approaches, in the way of definite action, that might be taken. One consists of certain concrete proposals, the necessity of which is so apparent to all that in mentioning them I realize that, with perhaps one exception, I am not offering anything new. On the contrary, I am simply raising one more voice to emphasize their importance to American industry in the situation in which it finds itself today. The other approach is of far greater significance, involving far greater difficulties.

Here is the first approach, as I see it:

The Approach to Our Problem

First. (a) There must be developed a spirit of cooperation with mutual respect and confidence among all groups. This is especially important to the two groups immediately concerned in the development of industry's policy functions—industrial management, on the one side, and government, on the other. Industrial and political statesmanship of the highest order are urgently needed.

(b) The rules under which industry is to operate must be established specifically by law—not by bureaucratic control.

Second. The budget must be balanced by reducing expenses of government—not by increasing taxation. Government's share is already absorbing far too great a part of our national income.

Third. We must change our method of levying taxes, not in favor of any particular group, but to insure an equitable distribution of the costs of government, so as not to restrict unduly the production and distribution of wealth in the interest of all. In doing so, we should give immediate consideration to the following:

(a) The capital gains tax should be eliminated to accomplish the best

result. It should, in any event, be sharply reduced to the end that there may be a free and unrestricted flow of capital into and within the security market.

(b) While it is unsound for any business to retain earnings not needed, in an economic sense, the difficulty of providing for all the varied conditions that arise suggests the elimination of the tax on undistributed earnings. It is a particularly dangerous burden on industry, in all events. If this is not done, some reasonable percentage, say 20 per cent, should be definitely allowed to provide for future needs, without penalty. While the burden on smaller units of business may, at the moment, be more generally recognized, the burden on the larger units will be recognized in a far more spectacular and disastrous degree as industry passes into the next period of adversity.

(c) I suggest a credit on profits retained subject to tax—if that method of taxation be continued—where business invests earnings in capital goods for expansion. I suggest a credit on profits retained subject to tax, as well as a corporation income tax credit where business invests earnings for the replacement of old with new instruments of production, irrespective of expansion. Here the credit should be on the basis of the undepreciated amount. This latter procedure is highly desirable because of the vital need of lower selling prices. Employment in the capital goods industry that so frequently lags behind would also be stimulated.

(d) Income taxes should be levied on a broader basis, not only from the standpoint of revenue, but more particularly from the standpoint of insuring a greater responsibility of

government. If everyone, instead of the three or four out of a hundred, as now, were made tax conscious by paying an income tax, however small, the government would make, and the public at large would save, many millions of dollars annually, that never would be spent.

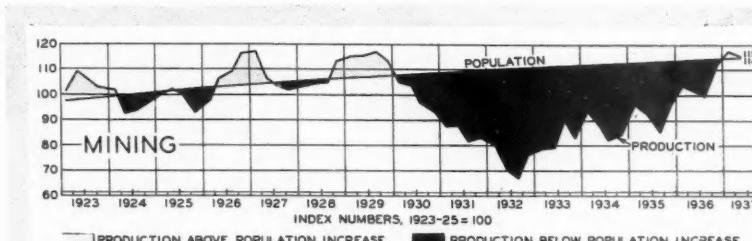
Fourth. (a) No law that prejudices unfairly the interests of one group as against another, can ever stand the test of time. It is wrong morally and economically. It is particularly objectionable where the groups are closely inter-related. The Wagner Labor Relations Act should be amended if the broad interests of industry, the public and labor itself are to be served.

(b) The workers within industry, when associating themselves together in the form of unions, must accept the same degree of responsibility as do other groups to respect the rights of others; to obey the law; to honor their contracts, and recognize their just share of industry's productivity.

Fifth. If a minimum wage and a maximum work week are to be established on a national basis, the standards should be determined by law—not by bureaucracy. In so doing, the standards should be set at such a point as not unduly to unbalance, economically, those areas in which money wages are below average levels. Improvement then should be by any evolutionary process as adjustments take place. Longer than the maximum hours should be permitted by the application of a reasonable penalty in the form of a wage premium. Maximum flexibility must at all times be maintained. The higher standards justifiable in many industries, as well as necessitated by the greatly varying cost of living.

(Turn to page 852, please)

Latent Demand



. . . Population growth and mineral production

Right or Left

After many years of labor, and it really has been labor, the American Standards Association has fairly well completed its project on terminology and definitions for single-point cutting tools. This standardization has come about through the cooperative effort of the SAE, ASME, and the NMTBA as sponsoring bodies. While the final report is not yet ready for release, the committee has successfully laid to ghost of the controversy—"What is right hand, what is left hand when applied to cutting tools." Now it's definitely settled. You look at the tool point, face up—if the cutting edge is on the right side, it's a right-cut tool; if the cutting edge is on the left, it's a left-cut tool. When this standard gets around there will be an end to all confusion.

Neoprene Sandwich

Some time ago we mentioned the development of a sandwich of felt and Neoprene. It had possibilities but no one knew just where to start. Only a few days ago we were shown two unique applications in a small engine building establishment. In one place they used a special washer for sealing the rear main bearing (it used to leak). In another place they used a special washer to seal the end of an inserted dry cylinder liner. For the latter application, the Neoprene sandwich seemed to withstand a temperature of 300 deg. Fahr., quite satisfactorily.

Life, Liberty

—and the pursuit of happiness. That's that arresting title of a booklet recently issued by the National Machine Tool Builder's Association. It has an enthralling story concerned with fact the machinery does not enslave—it emancipates. It compares the products of thirty or forty years ago with those of the present day, noting improvements, lower prices, and the rise of new industries made possible with the machine.

Animated Action

Pittsburgh office of the Bureau of Mines has added two new films to its library, both being of direct interest to the automotive-minded. "The Power Within" depicts the historic development, construction, and op-

eration of the engine and major parts of an automobile. The other film takes two reels to describe the operation of the oxy-acetylene torch and its application in joining and severing metals. Either one or both should make excellent material for technical and trade schools, and junior activities of engineering societies. Films are available in 16-mm and 35-mm size, on application, without charge save for transportation.

Night Lite

Some time ago we commented on the pioneer work of General Electric in the field of highway lighting to promote safety on the highways for those who drive at night. Much has been done in the interim. We recommend a reading of a small booklet, "We and Our Highways" issued recently by G. E. Apart from some significant statistics concerning lighted highways, you will find a great deal of interest in a group of illustrations showing experimental applications of daylight road illumination in various parts of the country. We can get you a copy if you want it.

Very Fast

While visiting the home of Lo-Swing lathes, we saw a demonstration of a new "Imp" lathe, an exceedingly fast and versatile machine that has done things to the bushing business. It was set up for forming and turning valve guide bushings. It's fully automatic and magazine fed. We won't mention productivity except to say that it is just amazing.

Production Lines

With Flame

There is always something new under the sun. Here for example is a new flame hardening machine for big work or parts that may be difficult to handle in conventional heat treating equipment, particularly on maintenance jobs. The people who make this product have a rather tricky machine for automatically hardening and quenching camshafts with the oxy-acetylene flame. If you are interested we shall be glad to put you in touch with the manufacturer. His name may be new to you.

Speed Chart

Kearney & Trecker whose motto is—"Doing one thing well"—have a small celluloid card for milling machine operators that's right handy and can be tacked on the wall most conveniently. One side gives the cutter speed in f.p.m. for various work materials and tool tip materials. Transfer the resulting figure to the other side, and you get the r.p.m. meters for the desired surface speed. How many of these cards can you use? Tell us, we'll get them for you.

Eye Appeal

For '38, as probably never before, the lighter trucks approach the passenger car in general styling and eye-appeal features. In fact, most of the commercial units produced by divisions of passenger car producers have the same styling as the passenger cars—and it's this year's styling.

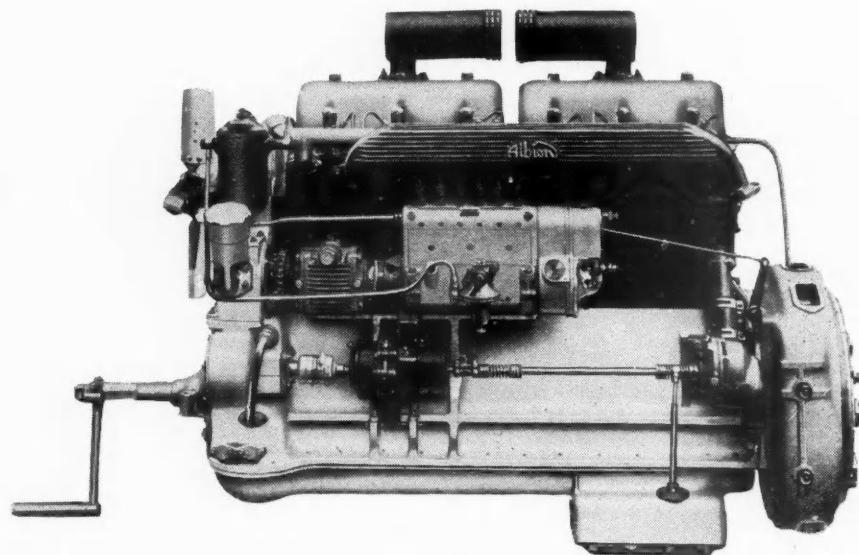
—J. G.

New Chassis—Engines—Accessories

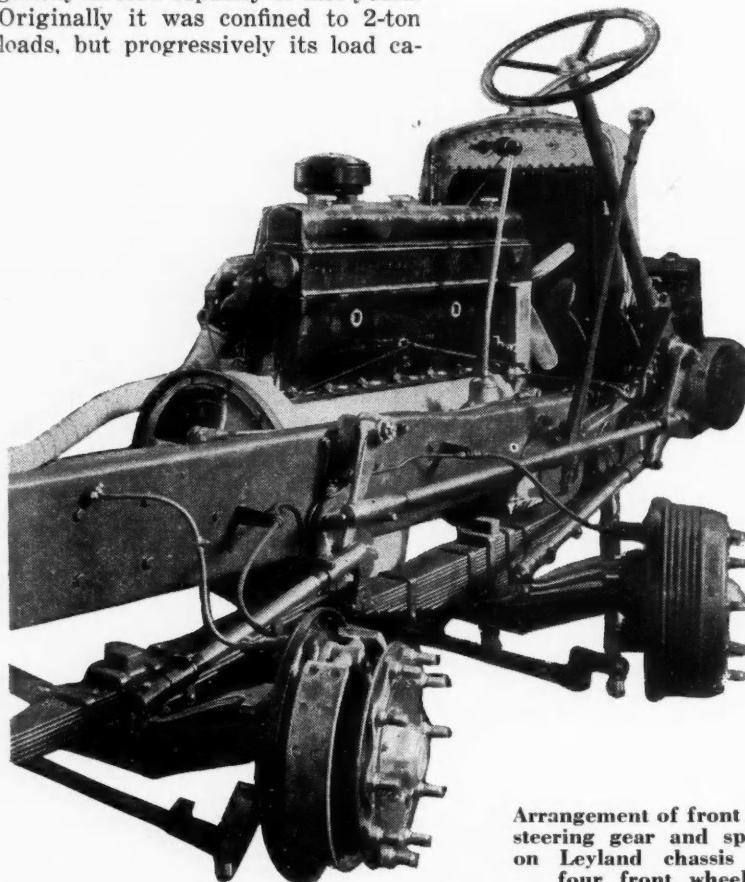
By M. W. BOURDON

APART from local delivery vans with payload capacities ranging from 600 lb. to 5000 lb., chief interest in trucks at the London commercial-vehicle show was directed toward those with four wheels weighing, unladen, just under 5600 lb. (2½ long tons), because they come just within a legal maximum that permits a high ratio of payload to unladen weight. A truck of this type may legally carry a load of as much as 9½ tons without exceeding the legal laden weight of a four-wheeler (12 tons), and it has a legal speed limit of 30 m.p.h. But any truck weighing more than 2½ tons unladen is restricted to 20 m.p.h.

This explains why the "2½-ton unladen" truck has increased so greatly in load capacity of late years. Originally it was confined to 2-ton loads, but progressively its load ca-



Albion six-cylinder direct-injection oil engine with 4½ by 5½-in. cylinders



Arrangement of front axle, steering gear and springs on Leyland chassis with four front wheels

pacity has been increased until at the present show there are several examples guaranteed to carry 5½ long tons and one (a Leyland) 6 long tons.

The demand for this class of truck exceeds that of any other, except local delivery vans, with the natural result that competition is keen, and there are five newcomers in this field. There is, however, very little technical development in gasoline-engined trucks, the chief innovations being the adoption of flexible mounting of powerplants and of steel-backed bearings.

In the heavier classes of truck, the chief new feature since the 1935 show is the provision of two steering axles. These are found on six-wheelers in some cases; the use of four wheels at the front and two at the rear, instead of vice versa, is said to eliminate tire scrubbing associated with four rear wheels and to provide for better weight distribution.

There are also eight British makes with four steering and four rear wheels carrying loads of 15-16 long

Interest London Truck Show Visitors

tons. Ordinarily the front suspension system and steering are little more than conventional, though duplicated. But in one case, the Scammell, there is a dual axle "bogie" carrying the front of the chassis through the agency of coil springs and rubber buffers located midway between the two axles; the latter are coupled together (forming the bogie) by two parallel stamped steel beams that combine the function of balancing, brake-torque and radius members. The arrangement positively locates the axles relative to one another and to the frame (apart from vertical movement) and affords freedom for independent vertical and tilting movement.

This new Scammell has a 512-cu. in. six-cylinder Gardner Diesel engine of 4½-in. bore and 6-in. stroke, developing 102 b.h.p. at 1750 r.p.m. Driven in tandem with the generator is a two-cylinder air compressor for

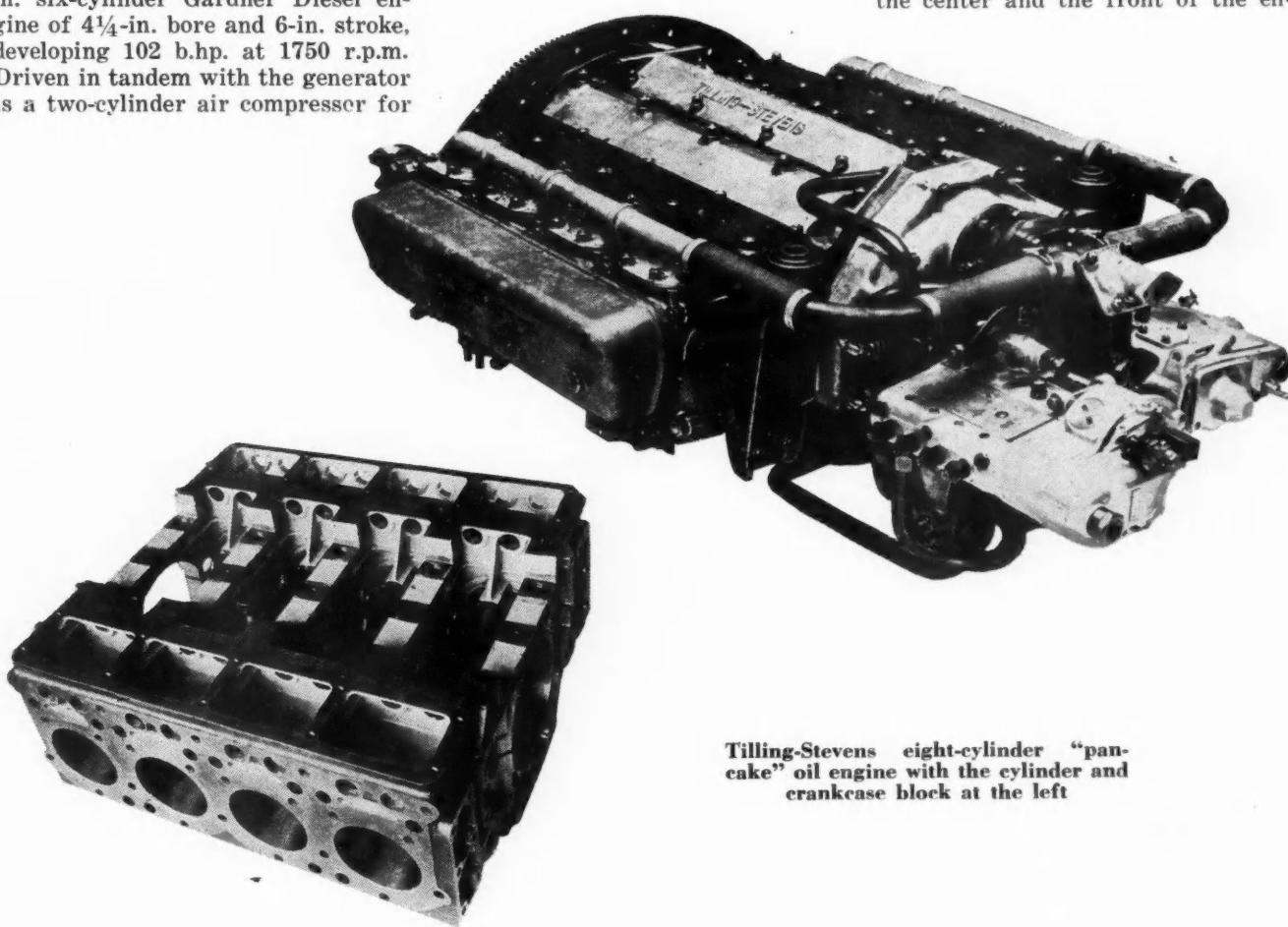
air-brake equipment operating on all wheels. The total braking surface is 939 sq. in., equivalent to approximately 43 sq. in. per long ton of gross weight.

Transmission is by a 16-in. Borg & Beck clutch and a separate six-speed gearset with overdrive sixth (of 1 to 1.5 ratio) controlled by a single lever. Only one of the rear axles is driven, the ratio being 9.43 to 1, with double-reduction gears.

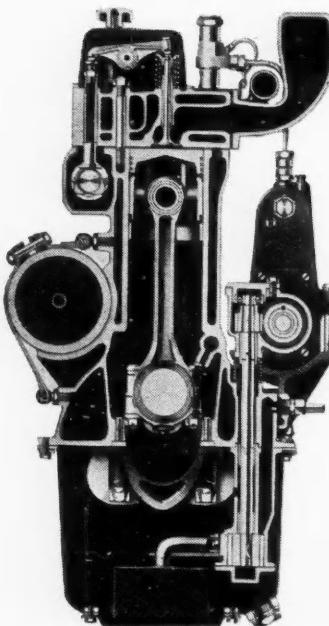
The use of only one driving axle on the new Scammell coincides with a prevailing trend in the case of six-wheelers and accounts to some extent for the development of the six-wheeler with four front and two rear wheels. For use on ordinary roads it has been found that four rear

wheels with single tires, as usual, provide little if any advantage in increase of traction relative to twin tires on two driving wheels. Hence the greater simplicity and lower weight of a trailing axle at the rear of one driving axle have the greater appeal, particularly as the lower weight represents additional scope for payload within the legal maximum.

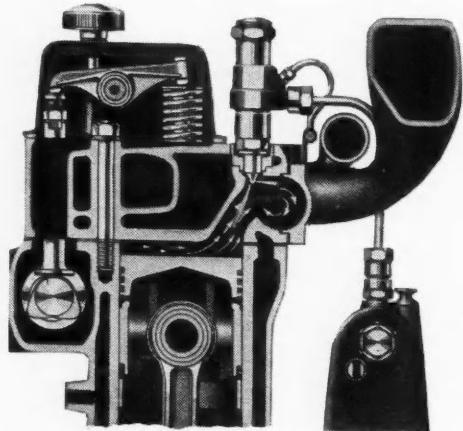
On the other hand, the use of four front wheels and two rear ones with a forward driving position gives better weight distribution when the legal maximum of laden axle weight is approached. Leyland has introduced new models for both buses and trucks with two front axles, a feature of which is that the radiator is located considerably to one side of the center and the front of the en-



Tilling-Stevens eight-cylinder "pancake" oil engine with the cylinder and crankcase block at the left



(Left) Transverse section of Perkins "Panther" oil engine and below the combustion chamber, showing double spray



gine brought forward alongside it. This arrangement and the fact that the whole of the engine is in front of the foremost axle enables additional length to be gained for the bodywork.

Oil-engined trucks are well represented at Earls Court, in sizes weighing over $2\frac{1}{2}$ long tons, unladen, and their sales during the past twelve months in England have increased by 20 per cent; but gasoline-engined trucks still constituted over 80 per cent of the total British sales in the same weight class.

Oil engine design in England is taking a distinct trend towards wider use of the direct injection type (without cell in the cylinder head.) Albion, Leyland and Tilling-Stevens have new oil engines of this type, while Gardner, whose stock engines are fitted by several chassis manufacturers, has always used direct injection, for which greater fuel economy is claimed, though unbiased opinion inclines to the view that the cell type of engine is superior in smoothness and silence of running.

A notable oil engine is a new model of the Perkins line known as the "Panther." It is the most striking example of the reduction in the specific weight of oil engines that has been effected during the past

few years, for with its commercial rating of 85 hp. it weighs less than 7 lb. per b.h.p. without flywheel, while at peak power and speed the ratio is approximately 5.2 lb. A 60-lb. flywheel is suitable for this engine, which works with a compression ratio of 15.8 to 1.

The bore and stroke are $3\frac{1}{2}$ by 5 in. and the displacement is 288 cu. in. A feature of the engine is its injection system. Two sprays are employed, one directed into the ante-chamber and the other toward the open cylinder, an arrangement which is claimed to combine the advantages of both direct and indirect injection. No heating plugs are needed for cold starting. The fuel is sprayed into the air stream passing through a venturi passage between the cylinder and the ante-chamber. The atomizers are arranged vertically in a row and are thoroughly cooled, cooling water from the pump being delivered through a three-branch manifold to the cylinder head and discharged around the atomizers and the overhead exhaust valves.

As regards other features of design, the crankshaft has seven bearings of $2\frac{3}{4}$ -in. diameter, these bearings having their top shells lined with lead bronze to take the combustion load, and the lower shells lined with white metal, to take the inertia loading. Big-end bearings (of $2\frac{1}{4}$ -in. diameter) also have lead-bronze upper and white-metal lower bushings.

The camshaft, driven by a triple roller chain, is located in a trough integral with and alongside the upper



Three - quarter rear view of Tilling - Stevens bus chassis with "under floor" engine

end of the cylinder block and operates the valves through rockers and short pushrods. This "high-cam-shaft" arrangement, by the way, is now a feature of several British oil engines.

B.H.B. aluminum pistons are used. Inlet and exhaust valve ports are of 1 13/32 and 1 3/16-in. diameter respectively. Aluminum cylinder heads with valve-seat inserts, which are offered as an option at extra cost, save 30 lb. in weight. Engine control is by the C.A.V.-Bosch pneumatic system.

An unusual system of crankcase ventilation is employed. Pipe connections are made at opposite sides of the air-inlet throttle, at points between which there is a difference in vacuum of about $\frac{1}{2}$ in. of water under all running conditions, and this pressure difference is utilized to cause a large proportion of the ingoing (filtered) air to be drawn through the overhead valve chamber and the crankcase.

The cylinder block and top half of the crankcase are of chrome-alloy cast iron, with the water jackets extending the full length of the bores, and enough metal is left in the cylinder walls to permit of fitting dry liners when reconditioning the engine. The crankshaft is a forging of nickel-chromium-molybdenum steel, electrically hardened, and connecting rods are drop forgings of chrome-molybdenum steel. The oil sump and overhead-valve cover are of pressed steel, and only the timing-gear housing is of aluminum.

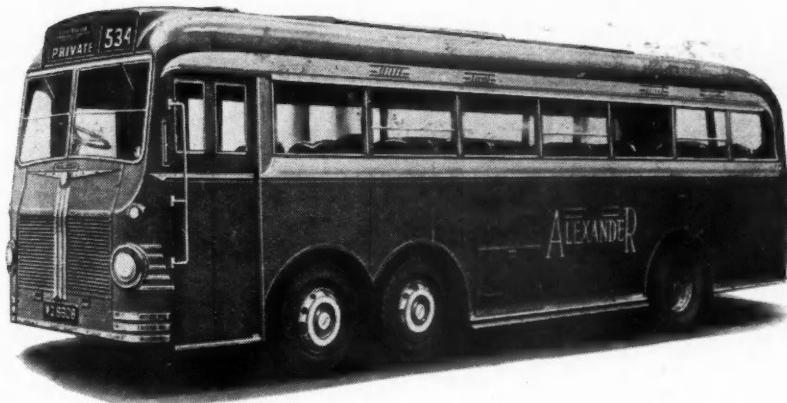
Another oil engine of note is that used in new six-wheeled goods and passenger chassis introduced by Tilling-Stevens. It is a "pancake" engine, a horizontally opposed eight-cylinder located under the floor of the bus or truck. An accompaniment is a seven-speed Maybach gearset with all gears constantly in mesh and brought into use by vacuum control; there are five ratios for normal use, an emergency low gear, and an overdrive seventh. When supplied for bus use, the chassis has independent springing for its four rear wheels. The drive is taken by the foremost rear axle only.

To reduce the over-all width of the engine, the stroke has been made less than the bore, cylinder dimensions being 4 5/16 by 3 7/8 in. This gives a displacement of 454 cu. in. and the rating is 110 b.h.p. at the governed speed of 1650 r.p.m. Crankcase and cylinder block are a single iron casting which is provided with separate "wet" liners. Cylinder heads are of aluminum alloy and are

(Turn to page 851, please)



Bedford (G.M.C.) 25-passenger coach



New Leyland bus with four front wheels coupled for steering



Crossley oil-engined double-deck bus



Charles A. Chayne

When a national meeting comes to town, local arrangements must click precisely. Buick's chief engineer was chosen for the Flint job.

BECAUSE of its key position in automotive production, Flint was made the scene for the SAE National Production Meeting which was held at the Durant Hotel, December 8, 9 and 10.

The success of the meeting was assured by the formation of a Flint committee on arrangements, with C. A. Chayne, Buick's chief engineer, as chairman. Principal speaker at the banquet on Friday night was Arnold G. Lenz, Chevrolet's assistant manufacturing manager.

The three-day program comprised formal plant visits to Flint plants, and a lineup of five technical sessions covering ten papers of broad interest to production men. Briefly, the program of technical papers was arranged as follows:

Forgeings and castings session with LeRoy V. Cram, Chevrolet, chairman. W. F. Pioch, Ford Motor Co., discussed the casting and machining details of the Ford cast steel alloy pistons. L. A. Danse, chief metallurgist, Cadillac Motor Car Co., presented a paper on precision forging practice.

The welding symposium was presented under the auspices of the American Welding Society, at which the SAE was represented by Fred W. Cederleaf, and the A.W.S. by Vaughan Reid of the Detroit City Pattern Works. Dr. C. A. Adams discussed the fundamentals of welding in which the place of different welding techniques in the automotive picture was evaluated. J. S. Williams, chief engineer, P. R. Mallory, took as his subject the recent developments in resistance welding.

National Production

V. P. Rumely, former vice-pres., in charge of Production Activity, was chairman of the session at which J. L. McCloud, Ford Motor Co., described the finishing of automotive parts with synthetic resin enamels, while D. A. Wallace, president, Chrysler Sales Div., described the purchasing, planning, and scheduling of Chrysler production.

An interesting machine shop practice session with W. H. McCoy, General Motors Research, in the chair, covered the fundamentals of the grinding process by R. V. Hutchinson, Olds; and peculiar machining problems of automatic transmissions by Fred Pyper, Buick master mechanic.

The final session with Joseph Geschelin, Detroit Technical Editor, AUTOMOTIVE INDUSTRIES, in the chair, dealt with precision machining problems, featuring R. B. Haynes, Spicer master mechanic, and C. H. Stanard, of Buick.

Some high-spots of a number of the papers presented at this meeting are given briefly below:

"Do We Understand the Grinding Process," a paper by R. V. Hutchinson, Olds Motor Works, attempted a scientific approach to the fundamentals of the grinding process. In his analysis, a mathematical basis for the practical problems and difficulties found in the grinding process is provided, his paper being supported by a large appendix describing the mathematical reasoning and premises.

Among other things, Mr. Hutchinson proposed the use of a grinding wheel dynamometer as an ideal means for studying the variables governing the life and suitability of a given wheel for a specific application.

A summary of the high-spots of this paper follows:

"(1) Heating of both work and wheel increases at a much faster rate than does the dulling of the grain.

"(2) Heating of the work surface may be reduced by:

- (a) Stronger abrasive
- (b) Weaker bond
- (c) Wider spacing of existing abrasive grains

(d) Increasing wheel speed combined with the foregoing.

"(3) Heating of work surface is partially proportional to length of chip path for given sharpness of grain. Length of chip path is proportional to square root of radial depth of cut, i.e., quadrupling the cut depth doubles chip path.

"(4) Average and maximum thickness of chip per grain are roughly proportional to radial depth of cut; doubling the cut depth almost doubles the chip thickness.

"(5) Tendency to wheel breakdown increases the depth of cut.

"(6) Heating of the wheel depends jointly upon the rate of dulling of the wheel, and upon the extent of filling of the inter-grain cutting clearance spaces in the active wheel face.

"(7) Heat developed at the work surface may be somewhat reduced by climb-cut grinding.

"(8) Friction between wheel and work due to scrubbing as the work passes the 'size-point' is potentially reducible in climb-cut grinding.

"(9) In grinding materials prone to heat checking, it is of first im-

portance to keep the work surface cool and free from violent temperature changes. Rather than attempt this with copious use of coolant, in some instances it may be better to separately cool the wheel, say by air blast or spray, at the same time using a very hard and strong abrasive grain in a fairly weak bond, with structure open enough to easily accommodate the chip volume per grain. To attain good wheel life it may be necessary to run at high surface speeds.

"(10) Where large percentage variations of local finish allowance may be anticipated, as in second operation cam grinding, it is sensible to

- (a) Use maximum possible surface speeds;
- (b) Use wheels of very open structure;
- (c) Use (a) and (b) in combination.

"(11) In finish grinding cams, especially on full automatic grinders, it is essential that adequate infeed control be had at all times."

In the paper, "Peculiar Machining Problems in the Automatic Transmission," Fred Pyper presented some details of the machining of vari-

ous elements of the Buick self-shifting transmission, production of which was described completely in AUTOMOTIVE INDUSTRIES, Sept. 11, 1937.

In concluding his paper, the author paid a fine tribute to the



Meeting at Flint

genius of the machine tool industry. "As we have approached the peculiar machining problems involved in the automatic transmission, a few of which we have discussed with you," said Mr. Pyper, "we have been helped immeasurably by the engineering experience of the machine suppliers. As a result of this cooperation the automatic transmission plant represents the latest developments of nearly 100 machine tool builders."

Discussing, "Economical Mass Production of Accurate Gears,"

Charles H. Stanard, Buick motor division, described the problems involved in producing gears for the modern "silent" transmission. He pointed out that there is no short cut to quality gearing and that the most economical method is to fulfill the requirements of uniformity, and accuracy.

How well these objectives have been attained may be gaged from his statement, "after assembling cases, the completed transmission is run in both directions at varying speeds and the number rejected for

noise or gear trouble runs consistently under 1 per cent of total production."

Without going into the details of the production of the several gears mentioned in the paper, it is of vital interest to note that in the initial steps for tooling transmission gears, the production department has the close cooperation of the metallurgical and forging departments. The first specifies the materials as to uniformity of quality and aids in maintaining control of quality; the second aids in the production of forgings of uniform structure with symmetrical distribution of stock about the pierced hole. Thus it has been recognized at Buick that quality gearing starts with the material and forging practice.

At Buick the forging is the ground work for the entire process, affecting the economy, uniformity, and final accuracy of the product. All operations start with the basic bore which is pierced in forging and subsequently broached rather than drilled. By this means the finished bore size in the blanks is produced on a broaching machine and serves as the basis for alignment on all machining operations. Grinding to finish the bore is necessary only in the clutch and second speed gears.

After machining, the matching of gears prior to assembly is in theory the final inspection operation, since Buick has found that under certain conditions of running-in, sound is the best indication of conformity to specifications.

When routed to the hardening department, gears have a tooth form tolerance of plus or minus, 0.00025 in. It has been found that for quietness and long service the mating tooth surfaces must be conjugate within 0.0002 in.

"Recent Developments in Spline and Gear Cutting and Finishing," by R. B. Haynes of Spicer Mfg. Corp., was concerned, in the main, with a rather startling innovation of applying the so-called, "climb-cutting" principle known for many years in milling machine practice, to the hobbing of shaft splines. After an experimental period of some 10 months of actual production experience, the results from climb hobbing were so superior to conventional methods that the author has been able to summarize them in rather striking fashion, as follows:

1—Climb hobbing always yields a finish on the sides of the splines obviously superior to that obtainable by conventional cutting. This superiority is so easily observed that customers, during the early stages

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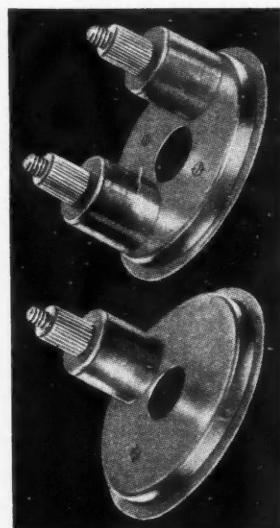
For specific information on prices and delivery, ask us to have a Zenith representative call.

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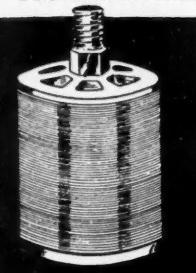
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The assembly of brass discs and spacers through which gasoline is filtered in a Zenith Fuel Filter. Openings are .002 of an inch, several times as fine as ordinary 100 mesh wire gauze.

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of the application, brought much pressure to bear to hasten the completion of the project.

2—Climb hobbing is invariably accompanied by an increase in hob life. This increase normally amounts to from 20 per cent to 30 per cent more pieces per hob.

3—Climb hobbing consumes less power per cu. in. of metal removed. This will normally be in the ratio of 1 hp. for climb hobbing to 1.10 hp. for conventional hobbing.

4—Climb hobbing produces little or no burr on the splines, thereby reducing, or, in some cases, eliminating subsequent burring operations.

5—The value of climb hobbing as a production process is not affected materially by coolants, speeds, feeds, or other factors in the operation.

Indeed the experience with climb hobbing was so exceptional that the company proceeded to extend its application to the hobbing of production gears. There has not been sufficient work done with the set-up to justify positive conclusions. However, a few test checks indicate the following results:

1—Finish of contour is superior with climb hobbing but not to the degree observed in splines. This is probably due to the fact that finish of gear tooth contours has long been given more careful consideration than splines.

2—Climb hobbing of gear teeth is accompanied by the same increase in hob life as was apparent in the spline experience.

3—Power consumption with climb hobbing of gears remained in the same ratio to conventional hobbing consumption as in the case of splines.

4—Climb hobbing of gear teeth does not affect accuracy of tooth form. This indication is astonishing in view of apparently opposite findings recently made public.

As if in answer to questions concerning the most approved methods for the scheduling of passenger car production, D. A. Wallace presented a paper entitled, "Purchasing, Planning and Scheduling Parts for Building Multiple Model Automobiles."

For 1938, Chrysler production includes three distinct models—the Chrysler Royal, the Chrysler Eight Imperial, and the Chrysler Eight Imperial Custom. The line includes the usual variety of body types, and in addition, 72 standard motor combinations, 14 standard paint combinations, three standard trim combinations, and the usual variety of special orders.

Mr. Wallace pointed out that production has been scheduled for the

following velocity of operations:

Time required to completely finish a body—14½ hours

Time required to finish and paint sheet metal—12 hours

Time for engine assembly—2½ hours

From start of frame assembly to delivery of a car to traffic department—1½ hours

The manufacturing division accepts orders from sales for carload combinations, etc., and promises to meet shipping dates on a basis of a 7-day schedule delivery. Delivery of the finished car after receipt of

order and beginning of framing operations is usually handled on a 3-day basis, but 7 days are required for the necessary manufacturing bank.

With all the complexity of orders, options, and carload lot requirements, complete coordination is essential between the divisions of the organization to permit the building of the schedule to individual orders, and to meet the promised delivery dates. To this end, the manufacturing division must be flexible and versatile. Plant and equipment must be

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Here is a tool that is being used in thousands of shops to increase production, add to equipment flexibility, and reduce costs. Available in both floor and bench models and with one or two spindles. Shopmen say it is one of the greatest drill press values ever offered.

Five Speeds: (385, 600, 935, 1450, 2240 R.P.M.) Floating Drive: Preloaded double-seal ball bearings: 16-tooth splined spindle: Table-Raising gear: Head-Raising gear: Tilting or production table: Completely enclosed belt: Safety spring wind: Foot-power feed. Separate drill press heads available.

Overall dimensions 66" high; 18" wide; 27" front to rear. Tilting table 11" by 12". Production table 12½" by 17" surface. Floor base 10" by 13¾" table surface. Shipping weight, 450 lbs.

Write for name of nearest Delta dealer and circular giving full details.

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arranged to permit a free flow and identification of the variety of materials used in building cars for mass production.

The preliminary steps for scheduling a new line are given as follows:

"1. The sales department throughout the building year estimates the number of cars they will require and how many cars are to be built daily, 90 days in advance.

"2. These estimates are forwarded to the general production manager, who, after consulting with the management, issues a material re-

leasing authorization to the planning department, setting up a manufacturing schedule that will insure maintenance of the estimated sales volume daily without making commitments for material which might later prove excessive.

"3. This detail schedule forms the basis on which all materials are released for manufacture within the plant or for delivery by vendors.

"4. Against this authorization, the sales department releases to the planning department a building schedule for the first month's pro-

duction and a tentative schedule for the second month.

"5. Sales department follows by furnishing, daily, in detail the particular colors and trim required for their individual customers and car-load combinations seven days in advance of shipping date."

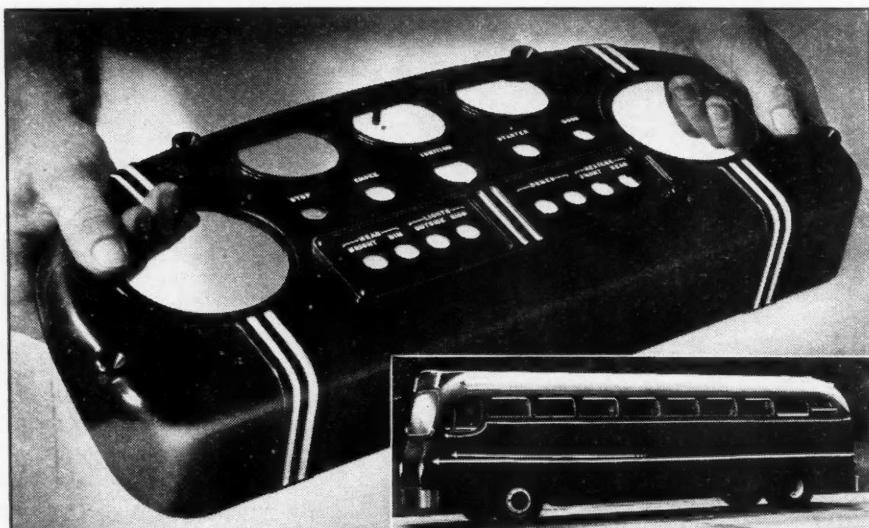
Racing Encourages Exports

COMMENTING—in a communication to the press—on the situation in the automobile racing field at the end of the 1937 season, Chairman Kissel of the Daimler-Benz Company says that during the period 1934-7 the so-called 750-kg. "formula" was in force, which limited the weight of the car with its four wheels but without fuel, coolant, lubricant, tires and spare wheel, to 750 kg., and imposed certain minimum body dimensions, but placed no restrictions on the design and displacement of the engine, on the design of the chassis, and on the composition of the fuel used in the race.

The problem therefore was to produce, within the limitations set by the regulations, a car of maximum speed, maximum reliability, maximum roadability, acceleration and deceleration. How great the difficulties involved is best shown by the fact that only five firms in the whole world attempted the solution of the problem. The question as to which of these firms was the most successful in the undertaking was furnished by the major international races held under the AIACR (International Association of Recognized Automobile Clubs) formula. Of the twenty-three such races held during the last four years, nineteen were won by the German automobile industry and no less than twelve by the Daimler-Benz Co.

Mr. Kissel proceeds to point out that there is hardly another event in the field of sport which so draws the attention of the whole world as a major international automobile race. And this, he holds, is no more than right, for success in such a race demands the most intensive preparation. Therefore, a victory in a major race is a victory for the whole nation.

That the sale of German stock cars abroad should be influenced favorably by these international racing successes goes without saying, and none other than Wilhelm von Opel, Chairman of the Board of the Adam Opel Company, owned by General Motors Corporation, on the occasion of the recent meeting of the Association of the German Automobile Industry, spontaneously expressed to the Daimler-Benz Co. and the Auto-Union the thanks of the whole industry for their extraordinary successes in international meets during the last four years.



FIRST MOLDED PLASTIC BUS DASHBOARD

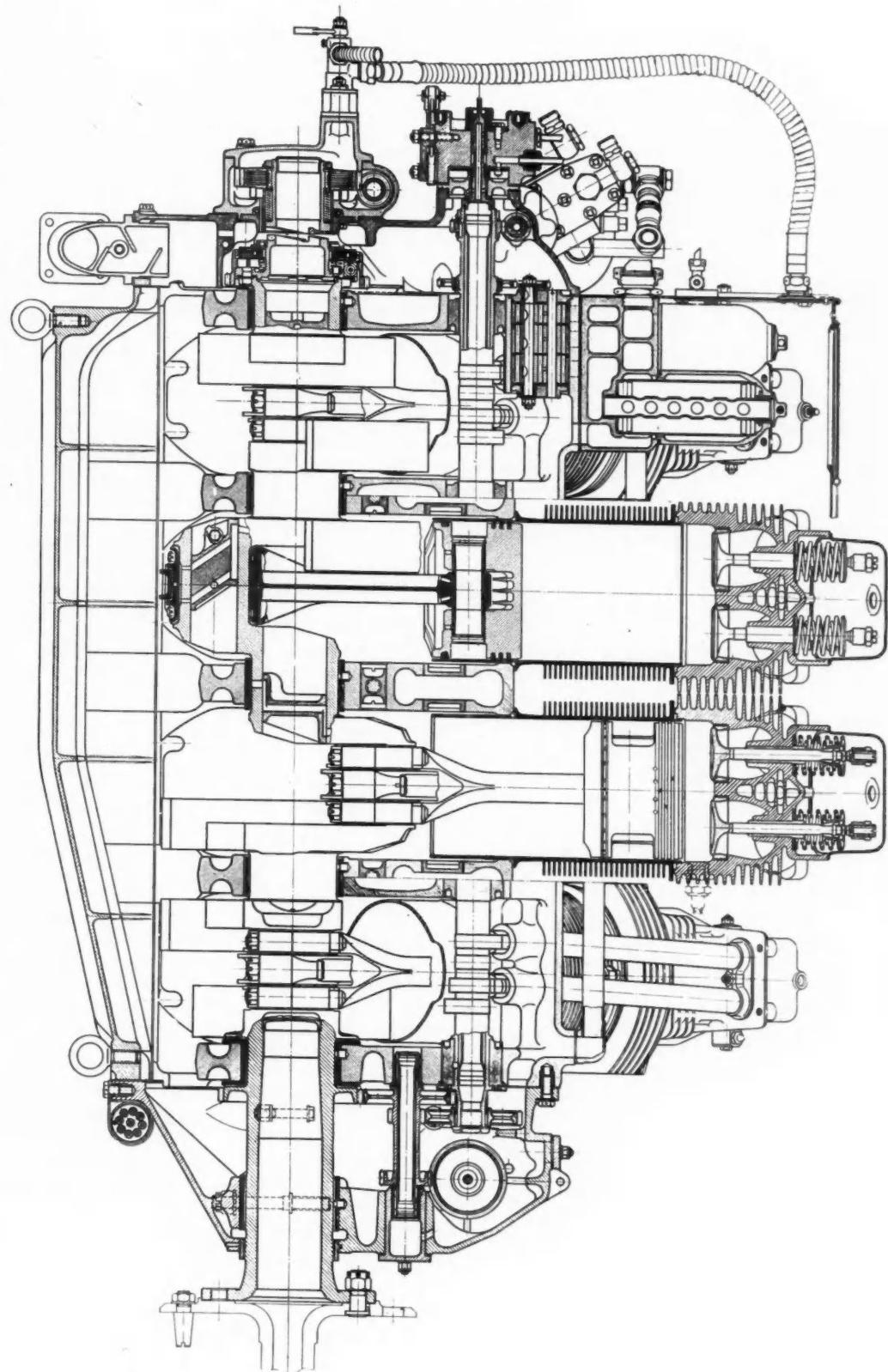
Another example of unusual modern design with DUREZ.

This smart new Durez dashboard, molded by Ward Plastic and Rubber Co., is now on latest models of a famous bus. It's molded in restful dark grey with white enamel wipe-ins. Weighing less than the lightest of light metal dashboards, it is just as durable and has all the strength necessary. It's easy to produce and saves many ordinary finishing operations because it comes from the molding press completely formed, including holes, metal inserts and mounting lugs for instruments and switches.

So we say once again if you're considering a new plastic application "try Durez first". With Durez you gain the extra strength of the phenolic plastic, plus limitless design possibilities, a lustrous wear-proof finish, a wide range of color. Whether you are interested in a special application or a standard one, we'll be glad to advise you, place our research laboratories at your disposal. For further information and free monthly copies of "Durez News" write General Plastics Inc., 212 Walck Road, North Tonawanda, N. Y.

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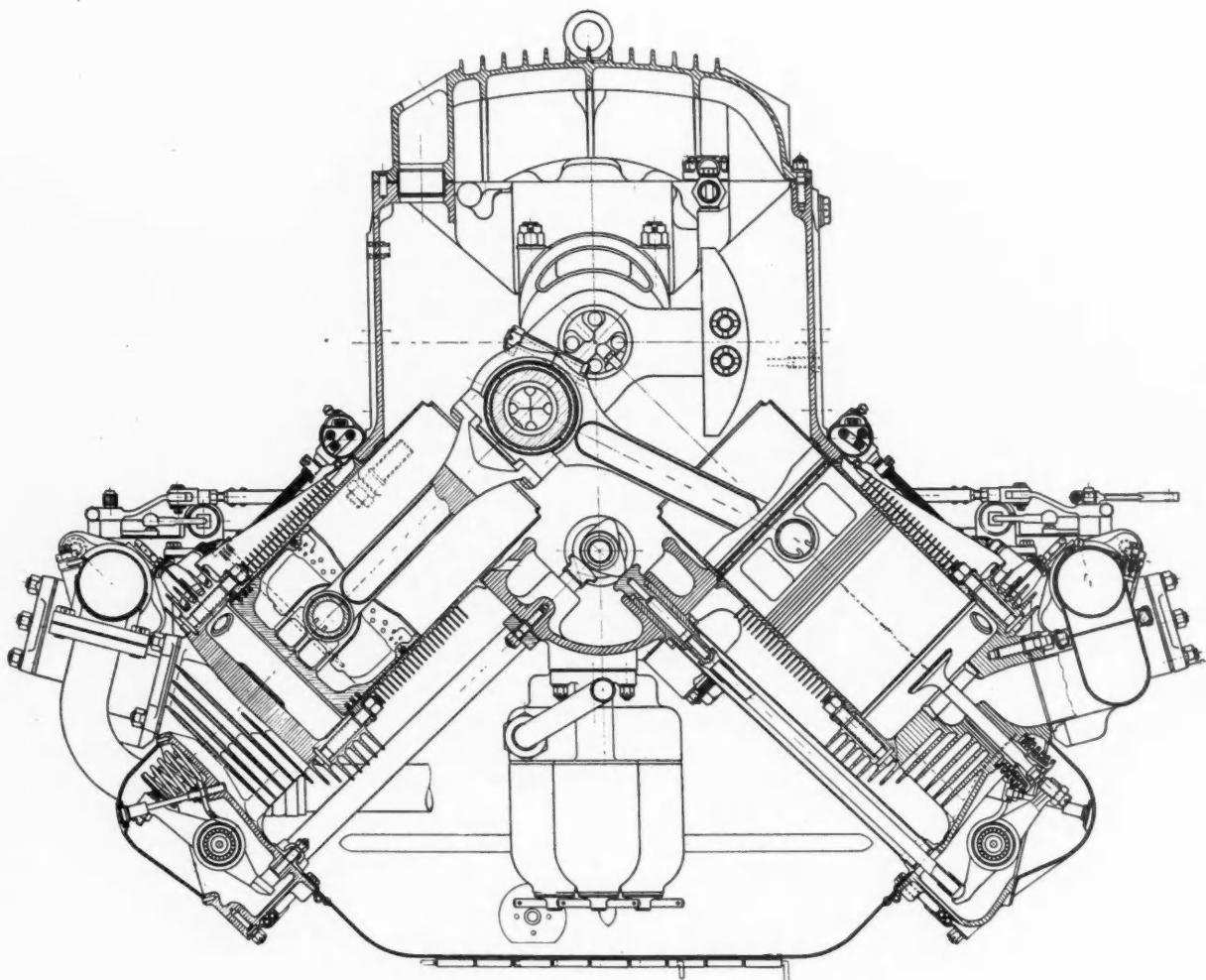
DUREZ *Choice of the Automotive Industry*



This eight-cylinder inverted V engine, Model As-10 C, Series 3, built by Argus Motoren Gesellschaft, Berlin, has a bore and stroke of 4.724 by 5.511 in. (834 cu. in.) and is rated 200 hp, continuous output at sea level, at 1880 r.p.m. For 30 minutes it can be operated at 1940 r.p.m. developing 220 hp, while the peak output, which must not be continued for more than 5 minutes, is 240 hp. at 2000 r.p.m. Scale 1:5.8±

Argus Aircraft Engine

Argus Aircraft Engine



The crankcase of this Model As-10 C, Series 3 engine consists of five heat-treated magnesium-alloy castings and is provided with longitudinal fins as an aid to cooling. Six steel-backed, lead-bronze bearings support the crankshaft, propeller thrust being taken on No. 2 bearing. Crank arms are provided with counterweights which are bolted to integral extensions of the arms. Crankshaft main journals and crankpins are bored out and provided with inserts of magnesium alloy in which the oil passages are drilled. Main bearings are supported by box girders formed in the crankcase castings, and air is blown through these girders to keep down the bearing temperature. Drive to the camshaft, which is located centrally below the crankshaft, is through a spring-cushioned spur-gear train at the rear end (opposite the propeller end).

Each cylinder with its cooling fins is machined out of solid forging. The aluminum-alloy cylinder heads are held in place by six studs each, and gas-tightness

of the joint is obtained by means of a soft-copper gasket. Each cylinder has two valves, and dual valve springs are used. Valve actuation is through enclosed pushrods and rocker arms, and the valve mechanism of each cylinder is protected by a cover. Of the two connecting rods working on each crankpin, one is a plain and the other a forked rod.

Lubrication is by the dry sump system, the distributing lines being partly inside and partly outside the engine. Valve rockers are grease-lubricated by means of a high-pressure gun.

There is one Sum carburetor and one Bosch magneto for each cylinder bank. Magnetos are of the impulse-type, to facilitate starting. Starting can be effected either by means of compressed air admitted directly to the engine cylinders (for which purpose special valves are provided), or by hand crank through a worm-type reduction gear having a reduction ratio of 12.5:1.

New Chassis - Engines - Accessories Interest London Truck Show Visitors

(Continued from page 848)

separate for each cylinder. A single camshaft operates all valves. The crankshaft has five lead-bronze bearings with steel shells.

To keep the engine as shallow as possible, dry sump lubrication is used, with a dual scavenging pump returning excess oil to a separate tank of 7 gallons capacity. The pressure pump delivers to the hollow camshaft and thence to the main crankshaft journals, crankpins and through drilled connecting rods to the wrist pins.

The all-gear distribution is a self-contained unit, the crankshaft pinion and all timing wheels running on ball bearings. Water circulation is by self-sealing pump; a thermostatic valve and by-pass are used for temperature control.

A horizontal oil engine under the floor is found also on a new bus chassis built by Leyland for the London Transport Board, though there is no example at Earls Court. In this case a more-or-less conventional six-cylinder oil engine is used, set on its side and driving through a fluid flywheel and Wilson preselective gearset modified for electro-magnetic control. The complete vehicle is a single deck bus on which the driver at the extreme front end is seated about 18 in. higher than usual in a half-width cab extending in front of the passenger structure, so that he has a view of the road immediately to each side of him and almost vertically on to the road in front.

Leyland, Albion and Tilling-Stevens for their new oil engines have adopted the "high-camshaft" arrangement introduced by Morris Commercial many years ago, but since dropped. The camshaft is located close alongside the top of the cylinder block and operates the overhead valves by very short pushrods (Leyland uses duralumin tubes) and rockers.

Quite a number of heavy trucks have more than four forward speeds, though with few exceptions they are oil-engined models. Thus Albion, Bristol and Dennis, among others, have five speeds with an oil engine and Scammell has six; the Tilling-Stevens just mentioned is the only make with seven speeds. A.E.C. provides a four-speed gearset with an additional two-speed transmission on some heavy-duty chassis.

Very few British trucks or buses

of larger capacity than 1500 lb. pay-load have any provision to facilitate gear-shifting. Daimler on a line of Diesel buses (Gardner five or six-cylinder engines) uses the Wilson preselective transmission with fluid flywheel, with either four or five speeds, and A.E.C. uses the same type of transmission for buses.

Even Bedford trucks and buses (made by Vauxhall, the British G.M.C. auxiliary) provides a synchromesh transmission only on models of 900 and 1350 lb. pay-load capacity, the chassis of which have passenger-car powerplants. Bedford trucks also come in 1½-ton, 2-ton and 3-ton models, all with a six-cylinder gasoline engine developing 64 b.h.p. at 2800 r.p.m. projecting half in front of the front axle. On the 1½- and 2-ton chassis the driver's position is behind the engine, but on the 3-ton chassis it is partly alongside.

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The 2-ton and 3-ton chassis differ from the smaller sizes, too, in having brakes (mechanical) with vacuum servo operation.

Vacuum servo braking is used on the majority of British buses and heavy-duty trucks, the Dewandre system being favored. There are two or three servo motors, or even as many as five, those for the front wheel brakes being formed as a unit with the swivel axle assembly to gain direct operation. On several chassis a vacuum servo assists Lockheed hydraulic cylinders exterior to

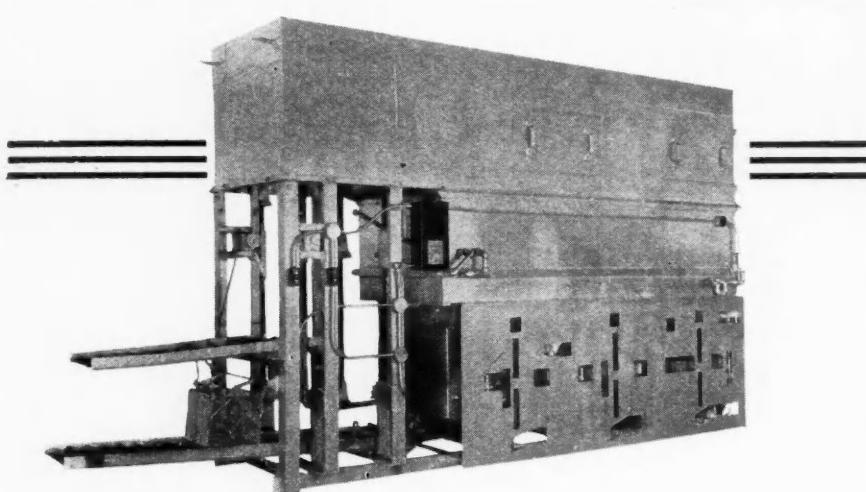
the brakes that actuate Girling wedge-type shoe expanders.

On an A.E.C. 56-passenger double-deck bus an emergency brake system is installed, for use either as a third brake by the driver or for emergency braking by either the conductor or passengers. The pedal brakes of this bus have servo-hydraulic operation with automatic adjustment.

A transmission development that cannot escape notice at Earls Court is the extensive use of the rubber-bushed universal joints, sometimes

only at the front end of the coupling shaft between the gearset and the propeller shaft. The type of joint referred to is known as the "Layrub," and is made by the Laycock Engineering Co. of Sheffield. It has two driving and two driven bolts passing through thick and wide rubber bushings with conical steel expanders locating the rubber in hemispherical housings in driving and driven disks. This joint is claimed to provide a cushioned drive, needs no lubrication, removes the need for sliding splined members, eliminates metallic contact between gearset and rear axle, reduces end thrust on the gearset and axle pinion bearings, and requires only new rubber bushings for reconditioning.

Eight British bus and truck manufacturers now produce trolley buses. They work in cooperation with electrical-equipment manufacturers, former manufacturers of conventional trolley cars that are now being displaced by oil-engined or trolley buses in towns and cities in all parts of Great Britain.



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Which Way? Asks Sloan

(Continued from page 838)

should be determined by collective bargaining. Where that is not available, it should be left to the action of management and measured by competitive standards existing in each community. Business is operated today on greatly varying wage standards. Some may be lower than are economically or socially desirable. But, to destroy by revolution the balance established over a period of years, as essential to carrying on what now exists, is an exceedingly dangerous procedure. It must be avoided.

But highly essential as these, or other proposals that might be made, may be in promoting a better operating opportunity within industry, they can not, in my judgment, of themselves produce either the intended effect or the results that many hope and which all of us so much desire. This, for the reason that they can not overcome the main obstacle to the general revival of American enterprise. This obstacle is even more fundamental in character. It involves the very foundation upon which our industrial enterprise is based. The condition of paralysis that is spreading throughout our national economy today is because of fear that that foundation is in jeopardy, hence confidence is lacking. Too many believe, and too much has

been done to make them believe, that the industrial system, as we understand it today, is being permitted to exist as a more or less temporary expedient—tolerated, I may say. Hence, that it is to be substantially altered or perhaps superseded. The spirit of industrial enterprise, which has contributed so much to our progress of the past, must be re-established on a firm foundation by demonstrated fact and understanding as to objectives and methods before American industry can go forward with confidence—nothing else will do. The alternative is simply to delay the final accounting. Until that time, men will not invest their savings and risk their property, neither will they do those other things so essential in stimulating the expansion of industry along the broad front necessary to effectively promote our national economy. And simply because they can not have the essential faith when involved in such great uncertainties. That appears to me to be the primary cause around which radiates all the secondary influences leading to the present situation.

Every Shoulder to the Wheel

Now, I have laid before you those problems with which industrial management has been so gravely concerned. All must subscribe wholeheartedly to the objective of more things for more people, everywhere, particularly having in mind those who today have the least. That has always been the purpose of industry—it could have no other purpose. I go so far as to say that I do not believe many have the imagination to visualize what is possible if we are willing to do those things that make it possible. Industry's objective requires the application of the "theory of plenty"—always a greater flow of goods and services. Our difficulty is, that our operating policies—such as increasing prices; less work; reduced flow of goods; bureaucratic control; artificial restrictions—lead us directly to the application of the "theory of scarcity"—less things for more people. We must readjust our national policies in accordance with our national objectives. But essential as all that is, of far more vital importance, and surrounded with far greater difficulty in its solution, is the re-establishment of confidence in the future of American enterprise. American industry has, from its very inception, traveled down the road of opportunity—always encouraged in its ambition to assume great undertak-

ings; largely free to work out its own destinies; recognizing at all times that even to survive, let alone to progress, it must do always a better and usually a bigger job; satisfied with the possibility of a reasonable profit for services satisfactorily rendered. All recognize that such a system, involving as it does human ambitions and shortcomings, is not by any means perfect—nothing ever is. It necessarily must be modified and adjusted from time to time in harmony with the evolution of things. But irrespective of every

consideration, truly marvelous things have been accomplished. Is the road of yesterday to be the road of tomorrow? How is it to be reconstructed? Or are we to embark on some new adventure—the rules, objectives, and purposes of which we know nothing? That seems to me to be the real problem that America faces today. In the meantime, industry stands at the cross-roads of doubt and uncertainty—all ready to go. It asks, however, and I believe it has every right to ask "WHICH WAY?", as it moves into the future.



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